MONTHLY WEATHER REVIEW.

Editor: Prof. CLEVELAND ABBE.

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INTRODUCTION.

The MONTHLY WEATHER REVIEW for March, 1898, is based on 2,929 reports from stations occupied by regular and voluntary observers, classified as follows: 147 from Weather Bureau stations; numerous special river stations; 32 from post surgeons, received through the Surgeon General, United States Army; 2,583 from voluntary observers; 96 received through the Southern Pacific Railway Company; 13 from Life-Saving stations, received through the Superintendent United States Life-Saving Service; 31 from Canadian stations; 20 from Mexican stations; 7 from Jamaica, W. I. International simultaneous observations are received from a few stations and used, together with trustworthy newspaper extracts and special reports.

Special acknowledgment is made of the hearty cooperation of Prof. R. F. Stupart, Director of the Meteorological Service of the Dominion of Canada; Mr. Curtis J. Lyons, Meteorologist to the Government Survey, Honolulu; Dr. Mariano Bárcena, Director of the Central Meteorological Observatory of Mexico; Mr. Maxwell Hall, Government Meteorologist, Kingston, Jamaica; Capt. S. I. Kimball, Superintendent of the United States Life-Saving Service; and Commander J. E. Craig, Hydrographer, United States Navy.

The REVIEW is prepared under the general editorial supervision of Prof. Cleveland Abbe.

Attention is called to the fact that the clocks and self-registers at regular Weather Bureau stations are all set to seventy-fifth meridian or eastern standard time, which is exactly five hours behind Greenwich time; as far as practicable, only this standard of time is used in the text of the REVIEW, since all Weather Bureau observations are required to be taken and recorded by it. The standards used by the public in the United States and Canada and by the voluntary observers are believed to generally conform to the modern international system of standard meridians, one hour apart, beginning with Greenwich. Records of miscellaneous phenomena that are reported occasionally in other standards of time by voluntary observers or newspaper correspondents are sometimes corrected to agree with the eastern standard; otherwise, the local meridian is mentioned.

STORM WARNINGS AND WEATHER FORECASTS.

By Lieut. Col. H. H. C. DUNWOODY, Supervising Forecast Official.

Under this head it is proposed to make note of all extreme and injurious weather conditions occurring during the month, and the warnings of the same issued by the Bureau, with instances, as far as reported by observers or the press, in which these warnings were of special public benefit. The signals displayed by the Weather Bureau will be referred to as "information," "storm," "hurricane," "cold-wave," and "norther," respectively.

The injurious weather conditions of note that occurred during the month were the storm of the 2d-5th, which moved from the east Gulf to the New England coast, the cold waves of the 20th-23d and 24-28th in the west and northwest, and the heavy rains in the central valleys which resulted in the floods during the latter part of the month in the Ohio and central Mississippi rivers. Injuriously low temperatures occurred in the truck raising districts of Texas on the 4th, and frosts, which in some instances were quite destructive, occurred in the fruit regions of California on nearly every night from the 12th to the 27th, inclusive. A severe norther, with gales on the coast, prevailed in California on the 9th and 10th.

STORM OF MARCH 2–5.

In connection with this storm the following maximum velocities during the twelve hours preceding the hours named were recorded, viz: 3d, 8 p. m., Savannah, 52 northeast; Charleston, 36 north. 4th, 8 a. m., Charleston, 46 northeast; Cape Henry, 52 northeast. 4th, 8 p. m., Atlantic City, 40 north; Block Island, 48 northeast; Nantucket, 42 northeast. 5th, 8 a. m., Block Island, 64 northwest.

Information signals for this storm were ordered from Pensacola to Norfolk at 9:30 a. m. of the 3d. These were changed to storm northeast from Jacksonville to Cape Henry at 1:30 p. m. of the 3d. At 10 p. m. of the 3d information signals were extended as far north as Boston, and storm northeast to Cape May. At 9:30 a. m. of the 4th storm northeast signals were extended to Boston. All shipping was well warned and no serious losses were reported.

COLD WAVES OF 20–23 AND 24–28 IN THE WEST AND NORTHWEST.

Concerning these cold waves Prof. E. B. Garriott, in charge of the Chicago forecast district, reports:

About 650 points in Wyoming, Colorado, South Dakota, Nebraska, Kansas, Minnesota, Iowa, Missouri, Wisconsin, Michigan, Illinois, and Indiana were forwarned by telegraph of the approach of the cold wave of the 20th–23d, together with all transportation interests in the States named, and thousands of persons and places were warned by prompt telephone and mail service. The advance of the cold wave was attended by light snow as far south as southern Kansas and southern Missouri. High winds were experienced over the western lake region during the day and night of the 22d. On the 21st, when the storm center occupied the middle Rocky Mountain region, the following message was telegraphed to the open lake ports: "Much colder, with snow flurries and high east to northeast winds by Tuesday morning;" and on the morning of the 22d, when the storm center had advanced to northwestern Illinois, the following was telegraphed to the open ports: "Cold wave to-night, with snow flurries; wind will shift to high northwest this afternoon." The night of the 22d the wind reached a maximum

velocity of 48 miles per hour from the north, and a velocity of 40 miles or more per hour was maintained for some time during the evening of the 22d. A wind of this velocity from the northward makes a tremendous sea on the south end of the lakes, and under the advice of this office boats about to sail for points on the eastern shore of Lake Michigan remained in port.

The cold wave of the 24–28th swept the Western and Northwestern States and carried the line of freezing weather into northern Texas. Warning of the approach of this cold wave was telegraphed twelve to thirty-six hours in advance of its arrival to some 700 points, and widely distributed to railroad and other interests throughout the entire forecasting district. The afternoon of the 26th, when the storm was central over the middle Rocky Mountain region, lake ports were notified that the wind would shift to northerly that night and become strong, with snow flurries. On the morning of the 27th, when the storm center occupied Oklahoma, lake ports were wired that "cold wave, snow flurries, and wind shifting to strong northerly may be expected by night." The afternoon and evening of the 27th the wind increased to a gale and attained a velocity of 64 miles per hour at night. No damage was reported, as boats were advised to remain in port, and, so far as is known, they did so."

In relation to the warning of the 24th issued at Chicago for Montana, Mr. J. Warren Smith, section director at Helena, Mont., reports:

The warning was distributed by mail to 369 places, and by free telephone and telegraph to about 75 places. The warning was received from six to twelve hours in advance of the storm, and was of great benefit to all stock interests. On receipt of the warning action was immediately taken, wherever possible, to place sheep and cattle in safe localities, either in sheltered places or in sheds, and for which there was ample time.

The following extracts from reports to this office show the interest in and value of the warning:

Clarks Ranch: "All sheep were kept close to shelter and fed; the value of property protected was $120,000; probably $2,000 worth would have been lost if sheep had been caught out; the warning is of great service to stockmen."

Lewiston: "Stock was kept in feed lots and general care taken; value of sheep and cattle protected, $58,000."

Great Falls: "Warning telephoned to all available places along the telephone lines; much appreciation expressed, and great credit given for timely warning."

Oka: "Sheep protected to the value of $40,000."

White Sulphur Springs: "Two hundred thousand head of sheep and cattle protected."

Virginia City: "We wired large stock owners along the lines; stock protected was very valuable; nearly all sheep in this section were taken to the sheds and hay fed."

Martinsdale: "Sheep were brought in and fed; sheep protected to the value of $300,000. There was very little snow in this valley, but too cold to graze stock."

The following extract from an article in the Greatfalls Tribune is given as of interest in this connection: "The severe blizzard which raged here on the 23d and 24th was certainly the worst ever experienced during the writer's life in Montana. * * * The temperature fell 42° in thirty-six minutes. * * * Great droves of cattle could be heard lowing and moaning above the roar of the tempest. * * * The drift was so furious that a few crevices no larger than a pencil in the side of a building were sufficient to fill the structure with snow from floor to ridge."

FLOODS IN THE OHIO AND CENTRAL MISSISSIPPI RIVERS.

Heavy rains in the central valleys, amounting to from 2 to 6 inches in excess of the normal for the month, caused a flood of considerable magnitude in the Ohio and central Mississippi rivers. Concerning the warnings issued for this flood and the benefits derived therefrom, the following reports from the officials in charge of the river forecast districts and newspaper extracts are given.

From Mr. Frank Ridgway, Local Forecast Official, Pittsburg, Pa.:

The river reached the danger line about 3 a. m., March 23, 1898, and continued at a flood stage until 5 p. m. of the 25th, the maximum height of 28.9 feet being reached at 1 a. m. of the 24th. Three flood warnings were issued, viz, at 2 p. m., 22d; 11.05 p. m., 22d; and 9 a. m., 23d, respectively. These warnings were thoroughly disseminated by telephone, telegraph, press, and through the Departments of Public Safety of both cities. No lives were lost, and it is estimated that property to the value of $500,000 was saved by the timely promulgation of the warnings. Following is a copy of a letter received from A. H. Leslie, Superintendent of Police, Pittsburg:

"PITTSBURG, *March* 26, 1898.

"DEAR SIR: If there be any doubt in the mind of the public as to the value of the Weather Bureau, the recent floods ought to remove it and convince the most skeptical of its worth in forewarning the public of impending danger.

"Upon receipt of the notice from you of the expected high water of 25 feet with the request that we warn the public, we sent word over our lines directing the patrolmen on the beats to notify those residing and doing business along the river fronts and streets adjacent thereto to make preparation and remove their property. The warning was generally observed, and resulted in the saving of hundreds of thousands of dollars in value which otherwise would have been lost to the individuals.

"We assure you that we appreciate the service we were permitted to render the public in the saving of their property by your timely warning and advice."

From Mr. S. S. Bassler, Local Forecast Official, Cincinnati, Ohio:

On March 22 and 23, 1898, the Muskingham, Scioto, and the two Miamis were pouring volumes of water into the Ohio and a flood of critical proportions was assured.

A peculiarity of the recent flood was that the river rose rapidly and was for several days above the danger line at all points at the same time.

On the 22d a warning was issued that the river at Cincinnati would pass the danger line during the night. It passed the danger line at 11 a. m. of the 23d, and the period the river was above the danger line at Cincinnati was from 11 a. m. of March 23 to 9:30 a. m. of March 29. On the 22d a warning was sent to Point Pleasant, W. Va., that the river there would pass the danger line on the following day. It passed the danger line at Point Pleasant on the night of the 23d and remained above the danger line there from the night of March 23 to April 2, the highest reported stage being 51.2 feet on March 27. On the 23d a local warning was issued that the river would reach 50 feet by the following morning and continue rising. The stage passed the 50-foot mark at 11 a. m. of the 24th. On the 23d a warning was sent to Parkersburg that the river there would pass the danger line by morning. It passed the danger line at that point on the night of the 23d–24th and was above the danger line from the 24th to the 29th of March, inclusive.

On the 24th another warning was sent to Point Pleasant of a big and sudden rise at that point during the night. A rise of over 7 feet occurred there by the morning of the 25th. On the 25th a warning was sent to Portsmouth, Ohio, and Cattlettsburg, Ky., that the stage at both places would exceed 55 feet during the night. The stage passed 55 feet at Portsmouth during night of 26th, and at Cattlettsburg not until night of 27th. At Portsmouth the stage was above the danger line from March 25 to March 31.

On the 26th a local warning was issued that the stage would reach 60 feet by the 28th. Warned Cattlettsburg of continued high stage till the 27th. Heavy rains in this locality caused a prolonged and somewhat accelerated rise below Portsmouth, while the river above was falling. On the 28th the statement was issued that the flood limit could not possibly be more than a trifle over 61 feet by morning. All on the edge of the flooded district were confidently assured that it would not reach 61.5 feet and gave themselves no further trouble.

Every means was taken to keep informed as to the conduct of the river from day to day. Special observations were supplemented by frequent observations received by the Chesapeake and Ohio Railway Company from along the line of their road and courteously telephoned to this office. The distribution of the flood warnings was through the press, the telegraph, and the telephone, by extra maps and reports posted in the flooded district, and by several parties to whom the reports and forecasts were at once telephoned and who acted as so many distributing centers. It appeared as if all business interests in the city affected, or likely to be affected by the steadily rising water, were in direct personal telephonic communication with this office. It is very gratifying to be able to say that the work of the Weather Bureau during the recent flood was thoroughly appreciated. Each successive flood demonstrates more and more the reliance placed upon the information given, but also increases the responsibility thrust upon the official.

No lives were lost nor even in jeopardy. The value of property saved by reason of its removal out of the reach of water can not be ascertained.

Cincinnati, Ohio, Commercial Tribune, April 4, 1898.—The Local Forecast Official of the Weather Bureau has been the hardest worked Government official in the city during the past two weeks, and his efficient work has been worthy of the praise of everybody. His river forecasts were exceptionally accurate and were much appreciated by not only the rivermen but the public in general.

Cincinnati, Ohio, Commercial Tribune, April 5, 1898.—The recent flood and the excellent manner in which the local United States Weather Office kept the business community informed in advance of the developments of the river have given the public generally a new idea of the value and importance of the office in its relations to the community.

LOW TEMPERATURES IN TEXAS.

In relation to the injuriously low temperatures that occurred in Texas during the month, the following reports from Mr. I. M. Cline, Local Forecast Official, Galveston, Tex., and newspaper extracts are given:

Galveston, Tex., March 8, 1898.—The 8 a. m. weather map Thursday, March 3, 1898, indicated injurious frosts throughout the vegetable districts, and the following special warning was included with the regular a. m. local forecast:

"Continued cool to-night and probably frost near coast."

There was heavy frost in places to the coast line, and light frost on adjacent islands Friday morning, with temperatures in the vegetable districts as follows: Galveston, 44°; Columbia, 31°; Brenham, 34°; Houston, 36°; Missouri City, 31°.

It is shown from information at hand that vegetation was protected generally as far as was possible and serious damage to the vegetable crop averted.

The following are from acknowledgments received relative to use made of this frost warning and its value to the public:

"Hitchcock, J. F. Ware.—Warning received about twenty-four hours in advance of frost. Many people covered up their vegetables and strawberries. Value of strawberries and early vegetables saved, from $500 to $2,000. It is hard to tell the amount of stuff saved in value."

"Alvin, C. W. Benson.—Warning of frost timely. Extra protection was given vegetation in forcing work. Early vegetables to the value of $1,500 were saved from injury by frost of night of 3d. No frost on night of 2d."

"Peppergrove, W. W. Gregory.—Warning was received twelve hours in advance of frost. All patrons of post office notified. All garden truck that could be was covered, which was considerable. Value of that saved, $500. The service is greatly appreciated."

"Harrisburg, T. G. Bennett.—The warning was received on the afternoon of the 3d, the day before the frost. All tender plants above ground were covered up. As far as heard from, several hundred dollars worth was saved. I can form no estimate as to the value."

"Laporte, A. O Blackwell.—Warning received about seventeen hours in advance of frost. It was bulletined and special attention called to it. Each farmer took such action as appeared necessary in protecting vegetables and fruits. The value saved was large, and amounted to hundreds and perhaps thousands of dollars. The patrons of this post office, and particularly the fruit growers and truck farmers, thoroughly appreciate these warnings. The warnings reach here at 5 p. m., and attention is at once called to the coming sudden changes. Most farmers are in town after that time and get the information."

"The value of the berry and vegetable crops at this time is very large, and the value of that susceptible to injury by frost is approximated at more than $20,000, and reports indicate that the greater portion of this was saved from injury by frost through the frost warning of the 3d instant."

Galveston and Dallas, Tex., Galveston and Dallas Daily News, March 8, 1898.—But for the timely warnings of the approach of this frost given out by the United States Weather Service, it is indicated that the loss in early vegetables would have been heavy, for where not protected on certain classes of soil the crops have been seriously damaged. The weather warnings in this instance, not to mention previous warnings, have saved thousands of dollars to this section. So marked has become the accuracy of the weather warnings during recent years that whenever a frost or freeze is predicted preparation is made for its reception at once by protecting vegetation and cutting off and draining water pipes. Actual temperatures expected have been predicted with sufficient accuracy to demonstrate that the warnings prepared by the Weather Service are based on scientific deductions made by having a knowledge of changes which precede, accompany, or follow certain conditions which present themselves. From reports published showing savings as a result of Weather Service warnings, it is noticed that the value of property saved to this section in a year is more than sufficient to pay the running expenses of the Weather Bureau, to say nothing of the vast savings to other portions of the country.

Galveston, Tex., Galveston Daily News, March 13, 1898.—The successful production of early fruits and vegetables along the Texas Coast has been demonstrated beyond a doubt. The only drawback in past years has been an occasional frost, and damage from this source has been removed through the certainty with which every frost or freeze has been predicted by the Weather Service for this locality during the past few years. These warnings are so accurate and timely that the only thing remaining necessary to insure success is means for the better protection of more extensive areas than the covering with hay, earth, and other matters when the Weather Service announces the approach of injurious conditions.

DESTRUCTIVE FROSTS AND SEVERE NORTHERS IN CALIFORNIA.

Concerning these conditions Mr. W. H. Hammon, Forecast Official, San Francisco, Cal., reports:

The month was one quite remarkable for the many frosts destructive to deciduous, and in some instances somewhat injurious to blossoming citrus fruit, and also unusual for northwest gales which were injurious to shipping along the north Pacific Coast, and which resulted in dry northers throughout the interior of California that greatly injured grain and feed.

On Thursday morning, March 10, a warning was distributed throughout northern California for "Killing frost Friday night, and, if wind ceases, to-night." Severe frosts occurred on Friday and Saturday mornings in a few sections of northern California, the lowest temperature reported being 26° at Yolo, Cal. On Sunday morning, March 13, warning of "Severe frost to-night" was distributed throughout northern California, and on Monday morning throughout the southern portion of northern California and throughout southern California and at Phœnix, Ariz. On March 15 warning of "Severe frost" was distributed in northern California; for southern California the warning read "Danger of frost where clear to-night." On the 16th the warning read "Severe frost where clear" in northern California, and "Severe frost to-night if clear" in interior of southern California. Similar warnings were distributed on the 17th and 18th. On Monday, March 21, a warning of "Severe frost Tuesday morning if wind ceases" was distributed throughout California. On Tuesday morning a similar warning was distributed throughout California and also sent to Phœnix, Ariz. On Wednesday morning the warning for California read "Frost to-night but less severe than last night." On Saturday, March 26, a warning for "Killing frost to-night" was distributed in northern California, and for "Severe frost" in southern California; this latter was also sent to Phœnix, Ariz. On every night when severe or killing frost was forecast injury occurred throughout some portion of the region in which the warning was distributed and on several nights the frost was generally injurious. The lowest temperatures probably generally occurred on the 16th and 23d. From a large number of newspaper articles relative to the injury done it would appear that the almond and apricot crops were for the most part generally destroyed and considerable injury done to peaches and other fruits then in blossom. Many efforts at protection were made, but were not generally successful, owing to the extreme severity of the frosts. In some instances even grain was severely injured.

On March 9 northwest storm signals were ordered displayed along the coast north of San Francisco. The signal was continued at Eureka throughout the 10th. On March 10 information signals were hoisted along the coast south of San Francisco "For high north winds increasing in force northward." On the afternoon of March 12 northwest storm signals were again displayed at San Francisco, and at points to the northward, and information signals as far south as Ventura. On the afternoon of March 14 information signal was ordered displayed at Port Harford. On March 22 northwest storm signals were distributed from Eureka to Point Conception. On the night of March 9 the wind reached a velocity of 39 miles an hour at San Francisco from the north, which caused many vessels to drag their anchors where no special precautions were taken, and those tied to the wharves were in some cases badly injured. The steamer *Eureka*, which was undergoing repairs at the wharf, was sunk and several small schooners were injured or capsized. The Coast Survey steamer *Patterson* collided with the bark *Martha Davis* and considerable injury was done to both. A severe norther prevailed at this period throughout the entire State. On the nights of March 12 and 13 considerable damage was done, the greatest disaster being the wrecking of the ship *New York* on the evening of March 13 in Half Moon Bay. On Tuesday, March 22, the bark *Alma* which left this port Sunday morning, March 20, for Alaska was found capsized off Pillar Point; 40 lives are supposed to have been lost.

AREAS OF HIGH AND LOW PRESSURE.

By Prof. H. A. HAZEN.

During the month the tracks of 9 highs were sufficiently well defined to be traced on Chart I, and those of 10 lows on Chart II. The accompanying table shows the principal facts relating to the origin and disappearance, the length of track, and velocity of these highs and lows. In taking the sums and means high No. VI has been omitted because of the shortness of its duration and lack of motion. The following notes are added:

HIGHS.

The locality of the first appearance of highs was to the north of Montana, exactly as in February. Nos. III and IV, however, have been traced to the Pacific. No. VII began in the middle Plateau Region. The general direction of apparent motion was a little south of east, and nearly all disappeared off the north Atlantic Coast. The temperature falls accompanying these highs were remarkably moderate. A fall of 40° in twenty-four hours occurred at Bismarck, p.

m. of the 8th, as high area III was to the north of Montana, but this was the only fall of consequence. As high No. VII approached Montana a fall of 44° in twenty-four hours occurred at Rapid City, p. m. of 21st. On a. m. of 22d the cold wave had extended southward, causing a fall of 42° at Wichita. Evening of the same day a fall of 46° was experienced at Concordia and Dodge City. This cold wave was broken up as it approached the Atlantic Coast, p. m. of 24th, by the rather permanent high area over the South Atlantic States.

As high No. IX moved into Dakota it caused a fall in temperature of 34° at Cheyenne, p. m. of 26. The cold wave extended south to the west Gulf States, p. m. of 27th, a fall of 38° occurring at Oklahoma. The cold wave diminished rapidly in intensity as it approached the Alleghanies and was practically over by the 29th.

LOWS.

As will be seen from Chart II three lows began to the north and northwest of Montana, four in southern Plateau on the border of the United States, two in the east Gulf States, and one in the upper Lake Region. The general movement was eastward or northeastward, and eight disappeared off the north Atlantic Coast. Nos. II and IX were last noted in the upper Lake Region. The storms of the north were quite moderate for March. A wind of 52 miles an hour occurred at Savannah, p. m. of 3d, as low No. II reached Florida. As this storm moved up the coast it caused a wind of 56 miles at Cape Henry, a. m. of 5th. As low No. V reached the lower Lake Region it caused a wind of 52 miles at Cleveland, a. m. of 13th, and 60 miles at Buffalo, p. m. of same day. Buffalo also reports a wind of 56 miles, p. m. of 19th, as low No. VII moved down the St. Lawrence. A wind of 56 miles was experienced at Toledo, p. m. of 27th, as low No. IX approached the upper Lake Region, and Chicago reported 64 miles the morning of the 27th.

Movements of centers of areas of high and low pressure.

Number.	First observed.			Last observed.			Path.		Average velocities.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long W.	Length.	Duration.	Daily.	Hourly.
High areas.		°	°		°	°	*Miles.*	*Days.*	*Miles.*	*Miles.*
I	28, a. m.†	53	111	4, p. m.	47	59	3,020	4.5	671	28.0
II	2, a. m.	51	112	8, a. m.	41	70	2,710	6.0	452	18.8
III	7, p. m.	49	127	11, a. m.	49	84	2,450	3.5	700	29.2
IV	8, a. m.	47	127	16, p. m.	39	70	4,690	8.5	552	23.0
V	15, a. m.	51	116	19, p. m.	46	59	3,280	4.5	729	30.4
VI*	17, a. m.	51	109	18, p. m.	51	101	390	1.5	.....	.....
VII	19, a. m.	41	113	22, p. m.	43	64	2,490	3.5	711	29.6
VIII	20, a. m.	55	114	26, p. m.	48	58	4,650	6.5	715	29.8
IX	24, a. m.	54	111	1, a. m.‡	40	78	2,550	8.0	319	13.3
Total	.....	.....	.....	.....	.....	.....	25,840	45.0	4,849	
Mean of 8 tracks	.....	.....	.....	.....	.....	.....	3,230	.....	606	25.3
Mean of 45 days	.....	.....	.....	.....	.....	.....	.....	.....	574	23.9
Low areas.										
I	28, a. m.†	50	90	3, a. m.	41	69	2,070	3.0	690	28.8
II	2, p. m.	29	88	5, p. m.	47	58	2,100	3.0	700	29.2
III	6, a. m.	53	114	10, a. m.	51	86	1,950	4.0	487	20.3
IV	9, p. m.	33	111	12, p. m.	49	69	2,490	3.0	830	34.6
V	10, p. m.	32	114	13, p. m.	50	67	3,150	3.0	1,050	43.7
VI	12, a. m.	51	124	18, a. m.	48	62	3,790	6.0	632	26.3
VII	16, p. m.	39	113	21, a. m.	47	55	3,090	4.5	687	28.6
VIII	20, a. m.	32	102	24, a. m.	48	51	3,090	4.0	772	32.2
IX	22, p. m.	54	112	28, a. m.	50	85	3,090	5.5	556	23.2
X	29, p. m.	32	84	1, a. m.‡	44	61	1,470	2.5	588	24.5
Total	.....	.....	.....	.....	.....	.....	26,260	38.5	6,992	
Mean of 10 tracks	.....	.....	.....	.....	.....	.....	2,626	.....	699	29.1
Mean of 35.5 days	.....	.....	.....	.....	.....	.....	.....	.....	682	28.4

*Not used in means. †February. ‡April.

THE WEATHER OF THE MONTH.

By A. J. HENRY, Chief of Division of Records and Meteorological Data.

The statistical aspect of the weather of the month is presented in the tables which form the closing part of this REVIEW. Table I in particular contains a variety of details from which the reader may select those most interesting to himself. The numerical values in the tables have been generalized in a number of cases, the results appearing on Charts Nos. III to IX, inclusive.

PRESSURE AND WIND.

Normal conditions.—The geographic distribution of normal barometric readings at sea level and under local gravity for March is shown by Chart VI of the MONTHLY WEATHER REVIEW for March, 1893.

There is generally a decrease in pressure over the United States and Canada in March, the decrease being greatest (0.10 inch) in New England, the Canadian Maritime Provinces, and Saskatchewan. Mean values over the northern and central Plateau regions also show reductions of from 0.05 to 0.10 inch. The regions of maximum pressure are in northern Minnesota and southern Georgia, with values of 30.15 and 30.10, respectively. The configuration of the isobars in March suggests a breaking up of the conditions that prevail during the winter season. The dominant high of the central Plateau region has almost disappeared; warm southerly winds from Arizona and the Gulf of California have set in toward interior plateaus and the establishment of a summer low in the place of the winter high has begun.

The prevailing winds in March are not materially different, as regards direction, from those of February, heretofore described (Vol. XXVI, p. 49). The principal changes occur on the south Atlantic Coast, where the northwesterly winds of February are supplanted by southwesterly winds in March, and in the southwestern districts, where southerly and southwesterly winds prevail, instead of the northerly winds of winter.

The current month.—Pressure was above normal from the Mississippi eastward to the Atlantic Coast, and also on the northern Slope and the north Pacific Coast. It was below normal over California, the Southwest, the Rocky Mountain Region south of Idaho, and the plains from the Gulf of Mexico to the British Possessions. Pressure was unusually high for the season over New England and the Canadian Maritime Provinces, the excess at Eastport and Halifax being 0.30 inch.

The highs of the month, in almost all cases, followed the northern track and persisted for several days over New England. The lows, in the majority of cases, moved from the Southwest to the Lake Region, thence easterly north of New England. As a result the prevailing winds of the latter were southerly or southeasterly, giving fair weather and abnormally high temperature to all of New England.

The movement of areas of low pressure from the Southwest to the St. Lawrence Valley, via the Lake Region, necessarily accompanies warm southerly winds over the Mississippi and Ohio valleys. The dividing line between southerly and southeasterly winds on the one hand, and northwesterly on the other, extends northeasterly from Denver to Duluth, a position considerably farther to the northwest than is usual. The winds of the Pacific Coast were almost invariably from the northwest, while those of the Mountain and Plateau regions were generally southwesterly.

TEMPERATURE OF THE AIR.

Normal conditions.—The normal mean temperature of the air in the United States in March varies from about 73° at Key West, 62° at Jacksonville, 62° at New Orleans, 62° at Galveston, 56° at San Diego to 29° at Eastport, 28° at Burlington, 30° at Buffalo, 32° at Detroit, 24° at Duluth, 15° at St. Vincent, 29° at Havre, 40° at Spokane, and 45° at Seattle, on Puget Sound. The warmest regions, as may be seen from the above figures, are the South Atlantic, Gulf, and Pacific Coast States; the coldest are the Red River Valley of the North and contiguous territory. The Pacific Coast is somewhat warmer than the Atlantic, and both are considerably warmer than the interior.

The differences between the normal temperatures of February and March are not large at stations on the South Atlantic, Gulf, and Pacific coasts, but at inland points, especially on the plains and in the upper Missouri Valley, the increase in the mean values of March over those of February is quite marked. The advent of spring in the last named region comes, therefore, a little earlier than in the Ohio Valley and elsewhere east of the Mississippi.

In studying the distribution of monthly mean temperatures it will be found very helpful to consult the charts at the end of this REVIEW, especially No. VI, Surface Temperatures, Maximum, Minimum, and Mean. This chart gives a very good idea of the variations of temperature with latitude and longitude, and also of the distribution of normal surface temperatures. Chart VI for any month will differ from a normal chart merely in the displacement or bending of the isotherms northward or southward according as the temperature of the particular locality is above or below the normal for the place and season.

The current month.—With the exception of three short periods of cold weather the month as a whole was unseasonably warm over nearly all the region east of the Rocky Mountains. West of the mountains, including also a narrow strip along the eastern foothills, the month was colder than usual.

The cold periods were: 1st to 3d, 20th to 24th, and 25th to 29th. The first of these was not especially severe, yet it brought the lowest temperatures of the month to the majority of stations in the South, and also in the Ohio Valley, the Middle States, and New England. The second cold wave entered Montana from the northward on the 20th, moved southeasterly along the main chain of the Rocky Mountains on the 22d, reaching the Gulf Coast on the morning of the 24th, whence it spread slowly northeastward, dissipating, however, before it reached the Atlantic Coast.

The lowest temperature observed during the passage of this cold wave and, in fact, the lowest observed within the limits of the United States during the month, was 37° below zero in Montana on the 22d. The temperature gradients in front of the cold wave, especially throughout Nebraska, Kansas, Missouri, and Arkansas, were very sharp, and falls of 60° in twelve hours were not uncommon.

In Arkansas the temperature dropped from 79° on the 22d to 29° on the morning of the 23d. The temperature west of the Continental Divide likewise fell sharply on the 22d and 23d. The third and last cold wave of the month, like the second, originated north of Montana. The lowest temperature reported in its course southeastward was 18° below zero at Havre, Mont., on the 26th.

Maximum temperatures of 90° and over were registered in Florida, Texas, Arizona, and the desert region of California. The highest maximum of the month was 101°, at Fort McIntosh, Tex., and the lowest minimum, 37° below zero, at Adel, Mont., an absolute range of 138°.

The distribution of the observed monthly mean temperature of the air is shown by red lines (isotherms) on Chart VI. This chart also shows the maximum and the minimum temperatures, the former by broken and the latter by dotted lines. As will be noticed, these lines have been drawn over the Rocky Mountain Plateau Region, although the temperatures have not been reduced to sea level; the isotherms relate, therefore, to the average surface of the country in the neighborhood of the various observers, and as such must differ greatly from the sea-level isotherms of Chart IV.

The average temperatures of the respective geographic districts, the departures from the normal of the current month and from the general mean since the first of the year, are presented in the table below for convenience of reference:

Average temperatures and departures from the normal.

Districts.	Number of stations.	Average temperatures for the current month.	Departures for the current month.	Accumulated departures since January 1.	Average departures since January 1.
		°	°	°	°
New England	10	39.5	+ 6.6	+10.3	+ 3.4
Middle Atlantic	12	46.8	+ 7.4	+10.5	+ 3.5
South Atlantic	10	59.1	+ 5.4	+ 6.3	+ 2.1
Florida Peninsula	7	69.0	+ 3.6	+ 1.5	+ 0.5
East Gulf	7	62.4	+ 3.9	+ 5.8	+ 1.9
West Gulf	7	59.6	+ 1.8	+10.4	+ 3.5
Ohio Valley and Tennessee	12	51.1	+ 7.1	+11.3	+ 3.8
Lower Lake	8	42.4	+10.0	+15.3	+ 5.1
Upper Lake	9	34.8	+ 7.7	+16.3	+ 5.4
North Dakota	7	22.4	+ 1.5	+24.1	+ 8.0
Upper Mississippi	11	41.2	+ 5.4	+15.7	+ 5.2
Missouri Valley	10	39.0	+ 3.2	+18.8	+ 6.3
Northern Slope	7	26.6	− 5.2	+ 9.0	+ 3.0
Middle Slope	6	41.9	− 0.4	+ 9.4	+ 3.1
Southern Slope	5	51.2	+ 0.6	+10.8	+ 3.6
Southern Plateau	13	45.7	− 2.7	− 2.1	− 0.7
Middle Plateau	9	34.1	− 4.3	− 8.3	− 2.8
Northern Plateau	11	34.9	− 2.9	+ 3.9	+ 1.3
North Pacific	9	42.9	− 2.1	+ 3.0	+ 1.0
Middle Pacific	5	49.9	− 2.4	− 3.4	− 1.1
South Pacific	4	53.9	− 1.6	− 1.9	− 0.6

In Canada.—Professor Stupart says:

The mean temperature of March was below average in the Northwest Territories, and particularly so in the southern portions of Alberta and Assiniboia, where the departure was from 8° to 10°. In western Manitoba the normal was just maintained, but thence eastward across the Lake Region there was an increasing plus departure, and in the Parry Sound, Nipissing, and upper Ottawa districts the mean was as much as 13° above average, and in southern Ontario from 6° to 9° above. From the Ottawa Valley east the departure became gradually less marked, and in the Maritime Provinces it was very generally between 6° and 8°.

Review of the season.—The chief characteristic of the winter that has just closed was its unusual mildness in the Lake Region, the Missouri Valley, the Dakotas, and elsewhere east of the Rocky Mountains.

The ice on the Great Lakes was not heavy and navigation on lower Lake Michigan was at no time interrupted. The Straits of Mackinac were clear by the 28th, the earliest date but one in sixty-three years.

On the Pacific Coast, December, January, and March were cold and dry; February was warmer than the average, but the winter, as a whole was colder than usual.

PRECIPITATION.

Normal conditions.—The regions of heavy precipitation in March (4 to 6 inches) agree substantially with those of February, so far as their positions are concerned. In extent, however, they are smaller and there is a marked diminution in the amount of rain that falls, especially on the Pacific Coast. The regions of moderate precipitation (2 to 4 inches) embrace the greater portion of the California coast, the lower Lake Region, the Ohio Valley, the Middle States, and New England, with smaller areas in Florida, the south Atlantic Coast, the west Gulf States, and the middle Mississippi Valley. The regions of scant precipitation are substantially the same as in the preceding month.

The current month.—The geographic distribution of precipitation for the current month is shown on Chart III.

Heavy rains fell over an oblong shaped area extending northeasterly from Arkansas to the lower Lakes, the fall being particularly heavy (10 inches and over) in Arkansas and Missouri. Relatively heavy precipitation, 215 per cent of the normal, occurred throughout the upper Mississippi Valley, and the fall over the northern slope was also generally in excess of the normal.

In Florida and along the Gulf Coast to eastern Texas the fall was much below the normal, the deficit being greatest in central Florida, where it is reported streams and wells are failing by reason of the drought.

The rainfall of the Pacific Coast was also greatly below the normal, much to the detriment of agricultural interests in that region. The partial failure of winter rains in California is not fraught with great danger to growing crops, provided seasonable rains fall throughout March and April. While the rainfall of December, 1897, and January, 1898, was much below normal, February gave moderate rains in almost all sections. The rains of March, however, fell greatly below the average, especially along the coast, and the outlook at the end of the month was not assuring.

The table below shows the total rainfall at the stations named from September 1 to March 31 of each year during which observations were made. The figures are of special interest at the present time.

Total or accumulated precipitation at selected California stations from September 1 to March 31.

Season.	Coast.						Great Valley.					
	Fort Ross.	San Francisco.	Santa Cruz.	San Luis Obispo.	Santa Barbara.	Yreka.	Red Bluff.	Sacramento.	Tulare.	Grass Valley.*	Truckee.†	Los Angeles.
	Ins.	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ins.*
1849-50	.....	32.6	.....	.....	.....	.....	.....	31.4	.....	.....	.....	.....
1850-51	.....	5.3	.....	.....	.....	.....	.....	2.9	.....	.....	.....	.....
1851-52	.....	17.1	.....	.....	.....	.....	.....	17.5	.....	.....	.....	.....
1852-53	.....	30.5	.....	.....	.....	.....	.....	31.4	.....	.....	.....	.....
1853-54	.....	20.1	.....	.....	.....	.....	.....	17.9	.....	.....	.....	.....
1854-55	.....	17.1	.....	.....	.....	.....	.....	13.2	.....	.....	.....	.....
1855-56	.....	18.2	.....	.....	.....	.....	.....	9.8	.....	.....	.....	.....
1856-57	.....	19.6	.....	.....	.....	.....	.....	10.1	.....	.....	.....	.....
1857-58	.....	19.9	.....	.....	.....	.....	.....	17.5	.....	.....	.....	.....
1858-59	.....	20.1	.....	.....	.....	.....	.....	14.0	.....	.....	.....	.....
1859-60	.....	16.1	.....	.....	.....	.....	.....	16.6	.....	.....	.....	.....
1860-61	.....	17.3	.....	.....	.....	.....	.....	14.4	.....	.....	.....	.....
1861-62	.....	47.7	.....	.....	.....	.....	.....	32.9	.....	.....	.....	.....
1862-63	.....	11.9	.....	.....	.....	.....	.....	9.6	.....	.....	.....	.....
1863-64	.....	7.7	.....	.....	.....	.....	.....	5.9	.....	.....	.....	.....
1864-65	.....	22.8	.....	.....	.....	.....	.....	20.7	.....	.....	.....	.....
1865-66	.....	21.1	.....	.....	.....	.....	.....	15.1	.....	.....	.....	.....
1866-67	.....	32.8	.....	.....	.....	.....	.....	23.4	.....	.....	.....	.....
1867-68	.....	36.3	.....	.....	23.1	.....	.....	30.2	.....	.....	.....	.....
1868-69	.....	19.1	.....	.....	15.1	.....	.....	14.7	.....	.....	.....	.....
1869-70	.....	14.1	.....	.....	8.4	.....	.....	11.1	.....	.....	.....	.....
1870-71	.....	10.2	.....	9.9	6.5	.....	.....	6.3	.....	.....	14.4	.....
1871-72	.....	29.8	.....	25.6	13.0	13.5	.....	22.6	.....	.....	39.3	.....
1872-73	.....	15.2	.....	12.8	10.4	10.4	12.4	13.7	.....	31.0	19.8	13.7
1873-74	.....	23.0	.....	19.5	14.1	11.3	14.8	21.6	.....	55.1	34.3	22.8
1874-75	48.2	19.2	15.7	19.7	18.6	9.3	12.5	16.6	.....	41.1	16.4	21.6
1875-76	54.6	29.7	.....	28.9	22.8	20.7	22.0	25.1	5.9	60.7	36.7	26.1
1876-77	29.6	10.6	.....	8.1	3.8	10.5	10.0	9.1	3.3	26.8	15.3	4.7
1877-78	89.4	34.0	.....	27.7	25.8	17.6	50.1	23.6	6.5	50.4	21.8	18.8
1878-79	45.7	20.3	18.5	9.7	11.7	9.1	16.7	13.9	1.6	46.4	19.2	9.9
1879-80	47.3	15.5	11.9	16.6	20.0	14.5	21.9	11.4	4.8	33.5	22.5	14.2
1880-81	60.5	26.8	27.4	21.9	14.5	17.2	25.7	24.4	9.2	54.0	19.6	12.7
1881-82	39.3	14.5	20.3	15.2	12.4	10.0	18.5	14.2	2.8	36.9	32.6	8.0
1882-83	35.8	15.1	14.8	12.1	10.0	9.2	13.7	14.5	4.0	32.6	8.8	9.9
1883-84	31.6	23.1	21.4	36.8	29.9	11.1	18.5	18.9	8.3	40.2	29.9	33.0
1884-85	33.9	14.7	13.9	14.2	10.1	11.4	12.0	15.8	4.1	38.9	18.3	7.1
1885-86	45.0	27.3	24.7	25.6	20.8	15.5	30.2	28.2	7.4	46.9	30.2	19.2
1886-87	23.0	16.3	15.2	14.5	11.2	12.7	12.9	11.4	3.7	28.7	20.2	11.3
1887-88	25.1	15.9	21.1	17.9	21.6	10.5	13.7	10.9	5.1	28.1	7.6	13.9
1888-89	24.5	20.7	20.9	19.0	20.2	7.0	19.4	16.2	6.2	28.3	8.8	18.3
1889-90	54.2	43.5	53.0	.....	31.8	25.4	37.3	30.7	11.5	82.7	41.3	34.4
1890-91	.....	13.8	15.7	.....	15.4	.....	18.2	13.0	6.1	29.4	18.4	11.7
1891-92	.....	15.1	18.6	.....	9.3	.....	15.2	11.6	6.6	31.8	16.2	9.6
1892-93	.....	20.6	32.8	.....	26.6	12.9	30.2	21.9	6.6	54.0	33.2	26.0
1893-94	55.0	16.1	26.1	8.2	5.9	25.6	19.1	13.8	4.4	43.5	30.1	9.7
1894-95	69.3	23.8	36.8	24.4	15.8	16.3	27.8	22.8	9.3	57.4	31.1	15.5
1895-96	45.9	15.3	17.2	15.5	11.5	16.4	17.4	16.9	4.5	40.6	.....	8.0
1896-97	59.9	22.3	27.6	20.2	.....	16.6	22.4	16.7	8.8	51.4	.....	16.7
1897-98	30.1	7.4	12.7	6.1	3.3	10.0	12.3	8.7	5.0	23.4	13.6	5.5

*Foothills region. †Upper Sierras.

Averages and departures by districts are summarized for convenience of reference in the following table:

Average precipitation and departures from the normal.

Districts.	Number of stations.	Average.		Departure.	
		Current month.	Percentage of normal.	Current month.	Accumulated since Jan. 1.
		Inches.		*Inches.*	*Inches.*
New England	10	2.64	67	−1.30	+0.80
Middle Atlantic	12	2.79	72	−1.10	−3.10
South Atlantic	10	2.92	65	−1.60	−6.80
Florida Peninsula	7	1.45	49	−1.50	−5.00
East Gulf	7	2.66	45	−3.20	−6.00
West Gulf	7	3.71	109	+0.30	−0.40
Ohio Valley and Tennessee	12	6.31	146	+2.00	+2.20
Lower Lake	8	3.20	123	+0.60	+1.70
Upper Lake	9	2.97	143	+0.90	+1.70
North Dakota	7	1.44	153	+0.50	−0.20
Upper Mississippi	11	4.87	215	+2.60	+3.30
Missouri Valley	10	2.81	155	+1.00	+1.00
Northern Slope	7	1.32	161	+0.50	−0.10
Middle Slope	6	0.88	59	−0.60	+0.60
Southern Slope	6	1.22	100	0.00	0.00
Southern Plateau	13	0.70	58	−0.50	−1.10
Middle Plateau	9	1.08	84	−0.20	−2.00
Northern Plateau	11	0.98	58	−0.70	−1.80
North Pacific	9	2.38	44	−3.00	−2.90
Middle Pacific	5	0.51	13	−3.50	−6.90
South Pacific	4	0.88	40	−1.30	−4.50

In Canada.—Prof. R. F. Stupart says:

The precipitation in the Northwest Territories and Manitoba was almost wholly in the form of snow, which was very generally in excess of the average fall for March. In the older Provinces, on the contrary, the precipitation was chiefly rain, which was in excess of average amount, but owing to the fact that the snowfall was either *nil* or small, the total precipitation for the month was in most localities below normal.

SNOWFALL.

The total snowfall for the current month is given in Tables I and II, and its geographic distribution is shown on Chart VIII. The snowfall of the month was rather light in all localities. Less than 20 inches fell in the northern peninsula of Michigan and less than 5 inches over Vermont and New Hampshire. The heaviest fall during the month occurred in Montana directly east of the main chain of the Rocky Mountains.

Snow on ground at end of month.—Little snow was reported except in northern New England, on the northern slope and at isolated points in the Plateau Region, and on the mountains of California and Colorado.

The following remarks are taken from the monthly reports of Climate and Crop Service Section Directors of Colorado, Michigan, Montana, and New England:

Colorado.—March having been similar to the winter months as regards deficient snowfall, there has been no increase of consequence in the amount of snow stored in the mountains. None of the reports indicate anything near the average March snowfall, though in a few localities the fall has been somewhat greater than during the winter months. The distribution of snowfall in the San Juan Mountains indicates that the early flow of the Rio Grande will be greater than last year, while that of June and July is likely to be less than at any time in the past twenty-five years, unless it is largely supplemented by rains.

Michigan.—The average depth of snow on the ground at the beginning of the month in the southern counties was 8.5 inches; in the central counties, nearly 13.0 inches; and in the northern counties, nearly 18.0 inches. This snow in the lower peninsula nearly all disappeared during the first ten days of the month, owing to high temperatures. The melting of the snow was immediately followed by quite general and moderately heavy rains, and during the rest of the month there was more than the normal amount of rainfall.

Montana.—The average depth of snowfall was 17.4 inches. The greatest fall was 46 inches at Dearborn Canyon; the least was 3 inches at St. Pauls. In most parts of the State the ground was well covered with snow throughout the month, though correspondents report that in the eastern districts the snow was piled up in low places while the ridges were bare. There seems to be an abundance of snow in the mountains and the prospect is good for plenty of water for irrigating and mining purposes. The snow has been beneficial to grass and winter grain also.

The storm of the 15th was exceptionally heavy in the northeastern part of the State; the snow was drifted to the depth of 6 to 8 feet in places in Lewistown. The cold wave and snowstorm which spread southward down the mountain valleys on the 20th-21st gave heavy snows in this section, which were badly drifted, and being followed on the 24th by another heavy fall with high winds, the cuts were blown full. The Great Northern Road could not get a train through over the Divide for several days, and stage lines were delayed everywhere. Newspaper clippings indicate more snow in the mountains than ever before known at the end of March.

New England.—Among the special features of the month worthy of notice, aside from the high average temperature, were the light snowfall and the gradual disappearance of the immense body of snow on the ground at the beginning of the month without causing floods. In regard to the latter, the Hollingsworth and Whitney Company, Winslow, Me., says: "The manner in which the snow has disappeared has been a surprise to us in this vicinity. The large amount on the ground one month ago caused much fear of a big freshet this spring, but the continued sunshine and lack of rain in quantity have been the means of carrying off practically all the snow so gradually that there has been very little rise in the Kennebec River. Reports from Moosehead Lake show that there is still a very large amount of snow there, which might cause a rise in the river, but as the ice is now running out, and is so porous, there is little danger of a freshet."

The snowfall of the month was decidedly below the average. At many places in the north it did not exceed 5 inches, and the maximum amount reported was 15 inches.

In Canada.—Prof. R. F. Stupart says:

In nearly all parts of Manitoba and the Northwest Territories there is a greater depth of snow on the ground than there was at the close of February. This is more particularly the case between Brandon and Qu'Appelle, and northward to Prince Albert and Battleford, where it varies in depth between 2 and 3 feet. There is still snow north of Lake Superior, but it is disappearing. There is also a considerable covering of snow in the lower St. Lawrence Valley and over the larger part of New Brunswick, in which province it varies from about 36 inches in the woods and from 10 to 12 inches in the clearings of the interior to but a few patches in St. John County.

ICE IN HARBORS AND OPENING OF NAVIGATION.

Mackinaw City, Mich., March 28.—The ice was driven out of the Straits of Mackinac by a heavy southwest gale.

Menominee, Mich., March 28.—Ice in Green Bay was driven out by a northwest gale, and the bay is now clear as far as can be seen.

Cleveland, Ohio, March 29.—The steamer *Margaret Olwill* left for Kelleys Island at noon to-day. She is the first vessel to leave port this season.

Buffalo, N. Y., March 25.—Steamer *Zenith City* left port for Lorain, Ohio, the first departure of the season.

Duluth, Minn., March 19.—Local navigation opened to-day by the arrival of the steamer *McFadden* from Iron River, Wis.

Sandusky, Ohio, March 25.—Barge *Keepsake* from Marine City, Mich., the first arrival of the season from upper Lake ports, reached port on the 23d.

Oswego, N. Y., March 22.—Navigation opened to-day by the arrival of the schooner *Fred. L. Wells*, light, from Sacket Harbor.

Yankton, S. Dak., March 8.—The ice went out of the river at 5 o'clock last evening, and this morning the channel is clear.

In Canada.—Prof. R. F. Stupart says:

Throughout the Northwest Territories and Manitoba the river ice is as thick or thicker than at the close of February; 22 inches is reported on the river at Banff, 24 inches at Medicine Hat, 24 inches at Swift Current, 18 inches at Battleford, and 18 inches at Regina. The rivers and Gulf harbors in New Brunswick are still closed; 14 inches is reported on the river at Fredericton, and 10 inches at Chatham.

HAIL.

The following are the dates on which hail fell in the respective States:

Arizona, 9, 10, 11, 22, 26. Arkansas, 15, 19, 20. California, 8, 9, 12, 13, 14, 15, 16, 17, 25, 26. Connecticut, 17. Georgia, 15. Illinois, 15, 16, 18, 27. Indiana, 16, 17, 19. Indian Territory, 12, 22, 23, 27. Iowa, 14, 17, 18, 20, 21, 27. Kansas, 14, 17, 21, 22. Kentucky, 15, 16, 17, 19, 23, 30. Louisiana, 2. Minnesota, 14. Mississippi, 3, 12, 14. Missouri, 14, 15, 16, 17, 18, 19, 21, 22, 23, 26. Nebraska, 14, 15, 18. New Mexico, 10. Ohio, 16, 17, 19. Oklahoma, 17, 19, 21, 22, 29. Oregon, 9, 11, 12, 13, 14, 15, 20, 21, 22, 23, 26, 27. Pennsylvania, 16, 19, 21. South Carolina, 30, 31. South Dakota, 14. Texas, 1, 7, 15, 23, 28. Utah, 7, 8, 10, 26, 28. Washington, 10, 31. West Virginia, 16. Wisconsin, 15.

The dates when hail was reported in the greatest number of States were: 15th, 10; 14th, 9; 17th, 9; 16th, 8.

SLEET.

The following are the dates on which sleet fell in the respective States:

Arizona, 9, 10. California, 9, 13, 14, 15, 16, 17, 18, 20, 21, 25, 26. Colorado, 5, 9, 10, 12, 14, 30. Connecticut, 4, 5, 16, 21, 22, 31. Delaware, 4. Idaho, 6, 7, 9, 12, 13, 15, 20, 25, 28. Illinois, 12, 23, 30. Indiana, 15, 16, 22, 23. Indian Territory, 23. Iowa, 10, 11, 17, 21, 22, 27. Kansas, 11, 22, 26, 27, 28. Kentucky, 1, 2, 29, 30. Maine, 17, 19, 22. Maryland, 2, 4, 21. Massachusetts, 4, 16, 22, 23, 31. Michigan, 9, 10, 11, 12, 13, 15, 18, 22, 27. Minnesota, 9, 14, 15, 16, 18, 22, 27, 28, 31. Missouri, 1, 4, 13, 22, 23, 27, 28. Montana, 3, 7. Nebraska, 10, 14, 18, 22, 26, 27. Nevada, 9, 13, 14, 15, 16, 21, 24. New Hampshire, 16, 17. New Jersey, 3, 4, 21, 24. New Mexico, 11. New York, 20, 21, 22, 23. North Carolina, 2, 4. North Dakota, 11, 12, 14, 15, 20. Ohio, 23, 24, 29. Oklahoma, 23. Oregon, 9, 12, 14, 16, 24, 25, 26, 28. Pennsylvania, 4, 15, 16, 21, 22, 30. South Dakota, 8, 26. Virginia, 2, 4, 17. Washington, 7, 9, 12, 13, 14, 15, 20, 23, 24, 25, 26, 27, 28. West Virginia, 31. Wisconsin, 10, 11, 15, 18, 21, 22, 25, 27, 28.

The dates when sleet was reported in the greatest number of States were: 4th, 9; 9th, 9; 14th, 8; 15th, 10; 16th, 9; 21st, 9; 22d, 12; 23d, 9.

HUMIDITY.

The humidity observations of the Weather Bureau are divided into two series; the first or tridaily series began in 1871 and ended with 1887; the second or twice-daily series is continuous from 1888 to the present time.

In the present state of knowledge respecting the diurnal variation in the moisture of the air, we are scarcely warranted in combining the two series in a general mean.

The monthly means of the second or present series are based upon observations of the whirled psychrometer at 8 a. m. and 8 p. m., seventy-fifth meridian time, which corresponds to 5 a. m. and 5 p. m., Pacific; 6 a. m. and 6 p. m., Mountain; and 7 a. m. and 7 p. m., Central standard time.

The normal for any district can be obtained by adding the departure to the average of the current month when the current humidity is below the normal (—), and subtracting it when it is above (+).

Average relative humidity and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
	%			%	
New England	80	+ 5	Missouri Valley	70	— 2
Middle Atlantic	76	+ 5	Northern Slope	69	+ 3
South Atlantic	81	+ 7	Middle Slope	58	— 2
Florida Peninsula	74	— 4	Southern Slope	53	— 3
East Gulf	82	+ 8	Southern Plateau	35	— 5
West Gulf	78	+ 8	Middle Plateau	60	+ 6
Ohio Valley and Tennessee	74	+ 4	Northern Plateau	70	0
Lower Lake	75	— 1	North Pacific Coast	75	— 5
Upper Lake	79	+ 1	Middle Pacific Coast	65	—11
North Dakota	75	— 2	South Pacific Coast	62	—12
Upper Mississippi Valley	73	+ 2			

In using the table by means of which the amount of moisture in the air is computed from the readings of the wet and dry bulb thermometers, the pressure argument has almost always been neglected, an omission that has little significance except for low temperatures and at high stations, such as Santa Fe, El Paso, Cheyenne, and a few others. The failure to apply a correction for the influence of the prevailing pressure on the psychrometer has the effect of making the monthly means of relative humidity at high-level stations too small by quantities ranging from 5 to 10 per cent. In the application of

the monthly averages of the above table, or those of individual stations in Table I, to special inquiries, whether in the departments of biology, climatology, or sanitary science, this fact should be kept in mind. It should also be remembered that the hours at which observations in the Rocky Mountain Plateau Region are made, viz, at 5 or 6 local mean time, morning and afternoon, give approximately the maximum and minimum values for the day; probably the means of such hours approach more nearly the true mean of the month than is the case on the Atlantic seaboard and in the seventy-fifth meridian time belt.

WIND.

High winds and local storms.—The high winds of the month occurred in connection with the atmospheric disturbances of the 14th, 21st, and 27th. The winds on the plains and in upper Missouri and Mississippi valleys were unusually high on the afternoon of the 14th.

15th.—A minor tornado passed through the eastern edge of the village of Hunter, Ark., about 4 a. m. of the 15th. Five persons were injured; 6 buildings were destroyed, involving a loss of $2,000. The width of the path of greatest destruction was 300 feet; length, 2 miles; direction of movement, toward the northeast.

18th.—An incipient tornado passed over Mound, Ill., at 7 p. m. of the 18th. No casualties; property loss about $1,000. The storm cloud did not reach the earth.

26th.—A very severe thunderstorm with some of the characteristics of a tornado passed through the southeastern portion of Indian Territory during the evening of the 26th. Seven people were injured at Coalgate, Ind. T.; 4 houses were destroyed and perhaps 50 others more or less damaged. One building was destroyed at Phillips, Ind. T., not far distant from Coalgate. The rainfall was very heavy.

The maximum wind velocity at each Weather Bureau station for a period of five minutes is given in Table I, which also gives the altitude of Weather Bureau anemometers above ground.

Following are the velocities of 50 miles and over per hour registered during the month:

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
		Miles				*Miles*	
Amarillo, Tex.	14	56	w.	El Paso, Tex.	21	63	sw.
Do.	21	64	sw.	Do.	22	54	sw.
Do.	27	56	n.	Do.	26	51	sw.
Block Island, R. I.	4	64	ne.	Do.	27	50	sw.
Do.	5	56	ne.	Fort Canby, Wash.	27	54	s.
Buffalo, N. Y.	13	60	sw.	Huron, S. Dak.	14	51	se.
Do.	19	53	sw.	Lincoln, Nebr.	21	52	nw.
Carson City, Nev.	12	53	sw.	Moorhead, Minn.	14	50	se.
Do.	25	54	sw.	Do.	15	52	se.
Cheyenne, Wyo.	14	50	nw.	Pierre, S. Dak.	15	53	w.
Do.	18	51	w.	Pueblo, Colo.	18	50	sw.
Chicago, Ill.	18	53	se.	Savannah, Ga.	3	51	ne.
Do.	27	50	s.	Sioux City, Iowa	14	60	s.
Do.	28	62	w.	Do.	21	52	nw.
Cleveland, Ohio	13	61	w.	Do.	22	50	n.
Denver, Colo.	8	53	nw.	Tatoosh Island, Wash.	20	52	nw.
Do.	14	52	nw.	Yankton, S. Dak.	14	50	s.
Dodge City, Kans.	14	59	sw.				

SUNSHINE AND CLOUDINESS.

The quantity of sunshine, and therefore of heat, received by the atmosphere as a whole is very nearly constant from year to year, but the proportion received by the surface of the earth depends upon the absorption by the atmosphere, and varies largely with the distribution of cloudiness. The sunshine is now recorded automatically at 21 regular stations of the Weather Bureau by its photographic, and at 47 by its thermal effects. The photographic record sheets show the apparent solar time, but the thermometric records show seventy-fifth meridian time; for convenience the results are all given in Table IX for each hour of local mean time. In order to complete the record of the duration of cloudiness these registers are supplemented by special personal observations of the state of the sky near the sun for an hour after sunrise and before sunset, and the cloudiness for these hours has been added as a correction to the instrumental records, whence there results a complete record of the duration of sunshine from sunrise to sunset.

The average cloudiness of the whole sky is determined by numerous personal observations at all stations during the daytime, and is given in the column "average cloudiness" in Table I; its complement, or percentage of clear sky, is given in the last column of Table IX for the stations at which instrumental self-registers are maintained.

The percentage of clear sky (sunshine) for all of the stations included in Table I, obtained as described in the preceding paragraph, is graphically shown on Chart VII. The regions of cloudy and overcast skies are shown by heavy shading; an absence of shading indicates, of course, the prevalence of clear, sunshiny weather.

The formation of fog and cloud is primarily due to differences of temperature in a relatively thin layer of air next to the earth's surface. The relative position of land and water surfaces often greatly increases the tendency to form areas of cloud and fog. This principle is perhaps better exemplified in the Lake Region than elsewhere, although it is of quite general application. The percentage of sunshine on the lee shores of the Lakes is always much less than on the windward shores. Next to the permanent influences that tend to form fog and cloud may be classed the frequency of the passage of cyclonic areas.

The current month.—Clear, sunshiny weather prevailed in Florida, the Southwest, the great valley of California, and the southern coast of the same State. There was also a greater percentage of sunshine than usual in New England, the Lake Region, the Missouri Valley, and the north Pacific Coast. Strangely enough the least sunshine in the United States was experienced in central Kentucky. Less sunshine than usual was also experienced in the Middle, South Atlantic, and Gulf States, the Ohio Valley and Tennessee, and on the Northern and Middle Slopes.

Average cloudiness and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
New England	5.4	−0.2	Missouri Valley	5.3	−0.3
Middle Atlantic	6.4	+0.9	Northern Slope	5.8	+0.5
South Atlantic	5.4	+0.7	Middle Slope	5.1	+0.7
Florida Peninsula	3.5	−0.5	Southern Slope	5.0	+0.8
East Gulf	5.6	+0.9	Southern Plateau	2.9	−0.1
West Gulf	6.5	+1.3	Middle Plateau	5.2	+0.3
Ohio Valley and Tennessee	6.4	+0.5	Northern Plateau	5.6	−0.9
Lower Lake	5.9	−0.5	North Pacific Coast	5.8	−0.8
Upper Lake	5.7	−0.2	Middle Pacific Coast	3.8	−1.2
North Dakota	5.2	−0.3	South Pacific Coast	3.2	−1.3
Upper Mississippi Valley	5.6	+0.1			

ATMOSPHERIC ELECTRICITY.

Numerical statistics relative to auroras and thunderstorms are given in Table IX, which shows the number of stations from which meteorological reports were received, and the number of such stations reporting thunderstorms (T) and auroras (A) in each State and on each day of the month, respectively.

Thunderstorms.—The dates on which the number of reports of thunderstorms for the whole country were most numerous were: 18th, 184; 19th, 180; 15th, 150; 17th, 146; 16th, 144.

Reports were most numerous from Missouri, 215; Illinois, 211; Ohio, 171; Kansas, 96; Arkansas, 93.

Auroras.—The evenings on which bright moonlight must have interfered with observations of faint auroras are assumed to be the four preceding and following the date of full moon, viz, from the 3d to the 11th, inclusive.

The greatest number of reports were received for the following dates: 13th, 30; 14th, 289; 15th, 252; 16th, 27.

Reports were most numerous from Illinois, 56; Wisconsin, 54; New York, 52; Ohio, 48; Massachusetts, 47; Minnesota, 42.

In Canada.—Auroras were reported as follows: Halifax, 14, 15; Grand Manan, 15; Yarmouth, 14, 15; Charlottetown, 15; Father Point, 15; Quebec, 15, 20; Montreal, 14, 15, 16; Rockliffe, 14, 15; Toronto, 14; White River, 15, 16, 18; Port Stanley, 14; Saugeen, 14; Parry Sound, 15; Minnedosa, 18, 19, 20, 22; Swift Current, 26; Prince Albert, 9, 21, 26, 29, 30; Battleford, 21, 25, 26, 27; Esquimalt, 14, 15, 16.

Thunderstorms were reported as follows: Montreal, 17; Toronto, 16, 19, 28; White River, 27; Port Stanley, 16, 17; Parry Sound, 15, 16.

CLIMATE AND CROP SERVICE.

By JAMES BERRY, Chief of Climate and Crop Service Division.

The following extracts relating to the general weather conditions in the several States and Territories are taken from the monthly reports of the respective sections of the Climate and Crop Service. The name of the section director is given after each summary.

Rainfall is expressed in inches.

Alabama.—The mean temperature was 59.6°, or 4.8° above normal; the highest was 89°, at Eufaula on the 24th, and the lowest, 23°, at Hamilton on the 4th and at Jasper on the 5th. The average precipitation was 3.22, or 2.43 below normal; the greatest monthly amount, 5.41, occurred at Newburg, and the least, 0.34, at Citronelle.—*F. P. Chaffee.*

Arizona.—The mean temperature was 50.7°, or about 5.0° below normal; the highest was 92°, at Fort Mohave on the 8th, and the lowest, zero, at Williams on the 14th. The average precipitation was 0.72, or slightly below normal; the greatest monthly amount, 3.89, occurred at Payson, while none fell at several stations.—*W. T. Blythe.*

Arkansas.—The mean temperature was 54.5°, or 3.4° above normal; the highest was 88°, at four stations on several dates, and the lowest, 18°, at Oregon, on the 3d and at Silversprings on the 24th. The average precipitation was 5.96, or 0.43 above normal; the greatest monthly amount, 17.56, occurred at Winslow, and the least, 1.20, at Fulton.—*E. B. Richards.*

California.—The mean temperature was 48.8°, or 3.6° below normal; the highest was 95°, at Salton on the 2d and 6th, and at Palm Springs on the 9th; the lowest was 16° below zero, at Bodie on the 18th. The average precipitation was 0.66, or 2.64 below normal; the greatest monthly amount, 4.22, occurred at Morses House, while none fell at several stations.—*W. H. Hammon.*

Colorado.—The mean temperature was 31.8°, or 3.0° below normal; the highest was 80°, at Lamar and Minneapolis on the 25th, and the lowest, 25° below zero, at Steamboat Springs on the 23d. The average precipitation was 0.88, or 0.38 below normal; the greatest monthly amount, 9.25, occurred at Ruby, and the least, 0.02, at Fort Morgan.—*F. H. Brandenburg.*

Florida.—The mean temperature was 67.5°, or about 2.0° above normal; the highest was 94°, at Bartow on the 23d, and the lowest, 30, at De Funiak Springs on the 5th. The average precipitation was 1.54, or considerably below normal; the greatest monthly amount, 3.26, occurred at Jupiter, while none fell at Kissimmee.—*A. J. Mitchell.*

Georgia.—The mean temperature was 61.0°, or 4.5° above normal; the highest was 90°, at Bellville on the 19th, and the lowest, 20, at Hopkinsville on the 5th. The average precipitation was 2.82, or 2.22 below normal; the greatest monthly amount, 8.52, occurred at Clayton, and the least, 0.91, at Hawkinsville.—*J. B. Marbury.*

Idaho.—The mean temperature was 31.4°; the highest was 74°, at New Plymouth on the 2d, and the lowest, 26° below zero, at Warren on the 22d. The average precipitation was 1.06; the greatest monthly amount, 3.23, occurred at Murray, and the least, trace, at Blackfoot and Chesterfield.—*D. P. McCallum.*

Illinois.—The mean temperature was 43.4°, or 4.8° above normal; the highest was 79° at Golconda on the 22d, and at Equality on the 26th, and the lowest, zero, at Lanark on the 3d. The average precipitation was 7.29, or 3.82 above normal; the greatest monthly amount, 14.16, occurred at Cobden, and the least, 2.66, at Lanark—*C. E. Linney.*

Indiana.—The mean temperature was 45.8°, or 7.1° above normal; the highest was 83°, at Vevay on the 19th, and the lowest, 11°, at Hammond on the 2d. The average precipitation was 8.11, or 4.39 above normal; the greatest monthly amount, 14.65, occurred at Princeton, and the least, 0.59, at Hammond.—*C. F. R. Wappenhans.*

Iowa.—The mean temperature was 37.5°, or several degrees above normal; the highest was 72°, at College Springs on the 26th, and the lowest, 2°, at Eldora, Neola, and Rock Rapids on the 1st, 22d, and 23d. Th average precipitation was 1.94, or slightly above normal; the greatest monthly amount, 6.21, occurred at Fort Madison, and the least, 0.33, at Marshalltown.—*G. M. Chappel.*

Kansas.—The mean temperature was 43.0°, or 2.0° above normal; the highest was 85°, at Englewood on the 8th, and the lowest, 7° below zero, at Coolidge on the 22d. The average precipitation was 1.52, or 0.05 below normal; the greatest monthly amount, 6.72, occurred at Oswego, and the least, trace, at Coolidge and Macksville.—*T. B. Jennings.*

Kentucky.—The mean temperature was 50.7°, or 4.6° above normal; the highest was 84°, at Alpha and Williamsburg on the 19th, and the lowest, 16°, at Loretto on the 4th. The average precipitation was 7.59, or 2.40 above normal; the greatest monthly amount, 10.33, occurred at Lyndon, and the least, 2.75, at Williamsburg.—*G. E. Hunt.*

Louisiana.—The mean temperature was 62.4°, or about 2.0° above normal; the highest was 88°, at five stations on several dates, and the lowest, 22°, at Robeline on the 4th. The average precipitation was 2.88, or 1.75 below normal; the greatest monthly amount, 5.99, occurred at White Sulphur Springs, and the least, 0.55, at Donaldsonville.—*R. E. Kerkam.*

Maryland and Delaware.—The mean temperature was 47.6°, or 7.4° above normal; the highest was 84°, at Boettcherville and Cumberland, Md., on the 19th, and the lowest, 7°, at Deerpark, Md., on the 1st. The average precipitation was 3.66, or 0.34 above normal; the greatest monthly amount, 8.34, occurred at Sunnyside, Md., and the least at Distributing Reservoir, D. C.—*F. J. Walz.*

Michigan.—The mean temperature was 35.4°, or 7.2° above normal; the highest was 72°, at Mottville and Vandalia on the 16th and at Berrien Springs on the 21st, and the lowest, 19° below zero, at Humboldt on the 3d. The average precipitation was 3.20, or 1.38 above normal; the greatest monthly amount, 6.68, occurred at Howell Junction, and the least, 0.42, at Ewen.—*C. F. Schneider.*

Minnesota.—The mean temperature was 30.1°, or about 5.0° above normal; the highest was 67°, at Beardsley on the 7th, and the lowest, 18° below zero, at Tower on the 2d. The average precipitation was 1.21, or slightly below normal; the greatest monthly amount, 2.97, occurred at Mapleplain, and the least, 0.20, at Milaca.—*T. S. Outram.*

Mississippi.—The mean temperature was 60.1°, or 3.7° above normal; the highest was 91°, at Columbus on the 21st, and the lowest, 20°, at Louisville on the 3d. The average precipitation was 3.93, or 2.22 below normal; the greatest monthly amount, 6.87, occurred at Jackson, and the least, 0.15, at Mosspoint.—*R. J. Hyatt.*

Missouri.—The mean temperature was 44.8°, or 2.7° above normal; the highest was 83°, at Malden on the 18th, and the lowest, 9°, at Potosi on the 4th. The average precipitation was 7.18, or 3.78 above normal; the greatest monthly amount, 15.48, occurred at Willowsprings, and the least, 1.63, at Bolckow. The precipitation was remarkably heavy over the eastern and southern portions of the State.—*A. E. Hackett.*

Montana.—The mean temperature was 23.6°, or below normal; the highest was 68°, at Billings on the 7th, at Choteau on the 6th, and at Fort Logan on the 2d; the lowest was 37° below zero, at Adel on the 22d. The average precipitation was 2.01, or 0.96 above normal; the greatest monthly amount, 4.60, occurred at Dearborn Canyon, and the least, 0.30, at St. Pauls.—*J. Warren Smith.*

Nebraska.—The mean temperature was 35.0°, or about 1.0° above normal; the highest was 81°, at Curtis on the 8th, and the lowest, 14° below zero, at Gering on the 22d. The average precipitation was 0.61, or about 0.56 below normal; the greatest monthly amount, 2.25, occurred at Burchard, and the least, trace, at several stations in the western section.—*G. A. Loveland.*

Nevada.—The mean temperature was 35.0°, or about 4.0° below normal; the highest was 79°, at St. Thomas on the 4th, and the lowest, 10° below zero, at Wells on the 15th. The average precipitation was 0.63,

or about 0.50 below normal; the greatest monthly amount, 2.01, occurred at Ely, while only traces fell at several stations in the south section.—*R. F. Young.*

New England.—The mean temperature was 38.4°, or 7.3° above normal; the highest was 69°, at Lowell, Mass., on the 11th, and the lowest, 12° below zero, at Flagstaff, Me., on the 4th. The average precipitation was 2.08, or 1.50 below normal; the greatest monthly amount, 4.27, occurred at Vineyard Haven, Mass., and the least, 0.30, at North Conway, N. H.—*J. W. Smith.*

New Jersey.—The mean temperature was 45.1°, or 7.9° above normal; the highest was 77°, at Asbury Park, Friesburg, and Vineland on the 19th, and the lowest, 16°, at Franklin Furnace on the 1st and 2d. The average precipitation was 3.33, or 0.64 below normal; the greatest monthly amount, 4.25, occurred at Staffordville, and the least, 2.56, at Atlantic City and Chester.—*E. W. McGann.*

New Mexico.—The mean temperature was 42.9°, or 1.5° below normal; the highest was 85°, at San Marcial on the 31st, and the lowest, zero, at Buckmans on the 14th. The average precipitation was about normal; the greatest monthly amount, 1.58, occurred at Gila, while none fell at Bluewater, Galisteo, and Raton.—*H. B. Hersey.*

New York.—The mean temperature was 40.6°, or 10.0° above normal; the highest was 73°, at Auburn and Avon on the 19th, and the lowest, 3° below zero, at North Lake on the 1st. The average precipitation was 2.35, or 0.44 below normal; the greatest monthly amount, 5.36, occurred at Bolivar, and the least, 0.61, at Garrattsville.—*R. G. Allen.*

North Carolina.—The mean temperature was 54.4°, or about 6.0° above normal; the highest was 91°, at Tarboro on the 21st, and the lowest, 15°, at Highlands on the 1st. The month was the warmest March on record. The average precipitation was 4.02, or 0.50 below normal; the greatest monthly amount, 11.30, occurred at Highlands, and the least, 1.52, at Wilmington.—*C. F. von Herrmann.*

North Dakota.—The mean temperature was 22.0°, or 1.7° above normal; the highest was 74°, at Berthold Agency on the 11th, and the lowest, 24° below zero, at Medora on the 26th. The average precipitation was 0.87, or 0.09 below normal; the greatest monthly amount, 2.16, occurred at Fort Yates, and the least, 0.16, at Woodbridge.—*B. H. Bronson.*

Ohio.—The mean temperature was 45.0°, or 8.0° above normal; the highest was 84°, at Pomeroy on the 22d, and the lowest, 5°, at Hillhouse on the 1st and at Bowling Green on the 3d. The average precipitation was 6.23, or 3.00 above normal; it was the wettest March in sixteen years; the greatest monthly amount, 11.07, occurred at Cedarville, and the least, 2.37, at Ashtabula.—*H. W. Richardson.*

Oklahoma.—The mean temperature was 48.8°; the highest was 85°, at Clifton and Kemp on the 16th, and the lowest, 7°, at Arapaho on the 27th. The average precipitation was 3.87; the greatest monthly amount, 12.25, occurred at Tahlequah, and the least, 0.13, at Hopeton.—*J. I. Widmeyer.*

Oregon.—The mean temperature was 39.9°, or 2.4° below normal; the highest was 74°, at Prineville, and the lowest, 4° below zero, at Silverlake. The average precipitation was 2.05, or 1.96 below normal; the greatest monthly amount, 8.61, occurred at Bay City, and the least, trace, at Burns and Riverside.—*B. S. Pague.*

Pennsylvania.—The mean temperature was 44.0°, or 9.3° above normal; the highest was 83°, at Hollidaysburg on the 19th, and the lowest, 4°, at Saegerstown on the 1st. The average precipitation was 4.31, or 1.07 above normal; the greatest monthly amount, 8.40, occurred at Grampian, and the least, 2.06, at Athens.—*T. F. Townsend.*

South Carolina.—The mean temperature was 59.1°, or 5.1° above normal; the highest was 92°, at Gillisonville on the 23d, and the lowest, 22°, at Greenville on the 1st, and at Walhalla on the 8th. The average precipitation was 2.99, or 1.47 below normal; the greatest monthly amount, 5.38, occurred at Trenton, and the least, 1.36, at Allendale.—*J. W. Bauer.*

South Dakota.—The mean temperature was 30.3°, or about 2.0° above normal; the highest was 74°, at Alexandria, Armour, and Greenwood on the 8th, and the lowest, 24° below zero, at Ashcroft on the 28th. The average precipitation was 0.83, or 0.25 below normal; the greatest monthly amount, 2.78, occurred at Ashcroft, and the least, 0.12, at Farmingdale.—*S. W. Glenn.*

Texas.—The mean temperature for the State during the month, determined by comparison with 38 stations distributed throughout the State, was 0.5° above the normal. Nearly normal conditions prevailed along the east coast, and there was a slight deficiency over west Texas and in some other localities, while there was a general excess for the month over other portions of the State. The greatest excess was over central Texas, with the greatest, 3.1°, at Menardville. The highest was 101°, at Fort McIntosh on the 19th, and the lowest, 11°, at Amarillo on the 23d. The average precipitation for the State during the month, determined by comparison with 39 stations distributed throughout the State, was 0.01 below the normal. There was a general deficiency over the panhandle and portions of west and central Texas, the eastern portion of north Texas, and east Texas, with the greatest, 2.41, at Weatherford. Over other portions of the State there was a general excess. Along the coast and in the vicinity of Forestburg and Camp Eagle Pass the excess was more than 1 inch. The greatest local excess for the month was 1.95, at Brazoria. The greatest monthly amount, 4.74, occurred at Conroe, while none fell at Fort Stockton.—*I. M. Cline.*

Utah.—The mean temperature was 34.2°; the highest was 80°, at St. George on the 7th, and the lowest, 14° below zero, at Heber on the 23d. The average precipitation was 1.24; the greatest monthly amount, 3.41, occurred at Scipio, and the least, trace, at Giles, Pahreah, and Tropic.—*J. H. Smith.*

Virginia.—The mean temperature was 50.0°, or about 6.0° above normal; it was the warmest March on record; the highest was 85°, at Bedford City on the 19th and at Petersburg on the 20th, and the lowest, 15°, at Dale Enterprise on the 1st. The average precipitation was 3.77, or 0.38 below normal; the greatest monthly amount, 5.10, occurred at Warsaw, and the least, 2.23, at Buckingham.—*E. A. Evans.*

Washington.—The mean temperature was 40.8°, or about normal; the highest was 71°, at Centerville on the 6th, and the lowest, 1°, at Hunters on the 22d. The average precipitation was 2.05, or 1.50 below normal; the greatest monthly amount, 7.42, occurred at Clearwater, and the least, trace, at Fort Simcoe.—*G. N. Salisbury.*

West Virginia.—The mean temperature was 48.5°, or about 6.0° above normal; the highest was 86°, at Eastbank on the 19th, and the lowest, 9°, at Oldfields on the 1st. The average precipitation was 5.43, or considerably above normal; the greatest monthly amount, 10.05, occurred at Weston, and the least, 1.25, at Nuttallburg.—*N. R. Taylor.*

Wisconsin.—The mean temperature was 33.9°, or 4.9° above normal; the highest was 66°, at Prairie du Chien on the 11th, and the lowest, 13° below zero, at Butternut and Hayward on the 4th. The average precipitation was 2.35, or 0.54 above normal; the greatest monthly amount, 4.50, occurred at Beloit, and the least, 0.30, at Bayfield.—*W. M. Wilson.*

Wyoming.—The mean temperature was 26.2°, or 5.4° below normal; the highest was 67°, at Fort Laramie on the 26th, and the lowest, 23° below zero, at Four Bear on the 22d. The average precipitation was 0.96, or 0.52 below normal; the greatest monthly amount, 2.73, occurred at Lander, and the least, 0.05, at Otto.—*W. S. Palmer.*

RIVER AND FLOOD SERVICE.

By PARK MORRILL, Forecast Official, in charge of River and Flood Service.

The moderate stages of the rivers prevailing at the end of February continued during the first half of March. During this time the ice in the Missouri and upper Mississippi broke up well toward their headwaters. A slight rise followed in both these rivers and their combined effect produced a decided freshet wave in the Mississippi at St. Louis. From the 15th a great flood rose in the Ohio, coming largely from its northern tributaries. At Cincinnati the rise was continuous to a maximum height of 61.4 feet, which was reached on the 29th. This is the highest stage in March since the record began in 1858. Great destruction was wrought by the flood on the streams of Indiana and Ohio, as well as along the Ohio itself. The freshet from the upper Mississippi, joined to that from the Ohio, inaugurated a flood of considerable magnitude at Cairo. The rise commenced on the 13th and continued at the end of the month, when a stage of 47.6 feet had been attained. Corresponding steady rises followed at Memphis, Vicksburg, and New Orleans.

Sharp but not very marked rises occurred near the middle of the month in the Arkansas and Red rivers. The freshets in the coastal rivers were slight and barely served to maintain navigable stages. Along streams where logging is carried on there is complaint of insufficient water to raft out the lumber.

The highest and lowest water, mean stage, and monthly range at 117 river stations are given in the accompanying table. Hydrographs for typical points on seven principal rivers are shown on the chart. The stations selected for charting are: Keokuk, St. Louis, Cairo, Memphis, and Vicksburg, on the Mississippi; Cincinnati, on the Ohio; Nashville,

on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.

For fuller details see Monthly Bulletin of the River and Flood Service for March, 1898.

Heights of rivers above zeros of gauges, March, 1898.

Stations.	Distance to mouth of river.	Danger line on gauge.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Mississippi River.	*Miles*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
St. Paul, Minn.[a]	1,957	14	4.2	11,15	2.8	29,30	3.7	1.4
Reeds Landing, Minn.	1,887	12	2.9	28-31	0.2	3-5	1.8	2.7
La Crosse, Wis.[b]	1,822	10	5.3	15	3.8	17,18	4.4	1.5
North McGregor, Iowa	1,762	18	5.8	15	3.6	1,2	4.6	2.2
Dubuque, Iowa[a]	1,702	15	5.9	13,14	4.3	25-27	4.9	1.6
Leclaire, Iowa[d]	1,612	10	4.7	12	3.1	25,26	3.8	1.6
Davenport, Iowa[a]	1,596	15	7.4	13	4.6	{25,27 / 30,31}	5.8	2.8
Keokuk, Iowa	1,466	14	8.5	20	1.1	4	5.1	7.4
Hannibal, Mo	1,405	17	10.8	20,21	1.9	6-8	6.7	8.9
Grafton, Ill	1,307	23	17.2	24	5.9	8-10	11.0	11.3
St. Louis, Mo.	1,264	30	25.2	24	7.2	9-11	15.2	18.0
Chester, Ill.	1,189	30	21.6	25,28	4.5	11	11.9	17.1
Cairo, Ill	1,073	40	47.6	31	16.0	12	30.0	31.6
Memphis, Tenn	843	33	32.9	31	10.3	15	20.0	22.6
Helena, Ark	767	44	41.0	31	16.5	15	27.0	24.5
Arkansas City, Ark.	635	42	42.0	31	19.0	15	28.7	23.0
Greenville, Miss	595	40	35.7	31	15.2	15	23.5	20.5
Vicksburg, Miss	474	41	38.5	31	19.2	17	27.0	19.3
New Orleans, La	108	16	12.9	31	7.8	20,21	9.9	5.1
Arkansas River.								
Wichita, Kans.	720	10	1.8	1-3	1.3	23,28-31	1.5	0.5
Fort Smith, Ark.	345	32	22.6	28	2.0	11	10.6	20.6
Dardanelle, Ark.	250	21	21.6	28	0.8	10,11	10.5	20.8
Little Rock, Ark.	170	23	22.3	30	3.0	11,12	12.1	19.3
White River.								
Newport, Ark	150	26	32.0	30	4.2	10,11	19.4	27.8
Des Moines River.								
Des Moines, Iowa[f]	150	19	4.6	23,24	3.5	5,6	4.0	1.1
Illinois River.								
Peoria, Ill.	135	14	19.3	31	11.6	9	14.9	6.7
Missouri River.								
Bismarck, N. Dak.	1,201	14	6.4	{17,19-21 / 23,24}	5.0	7-9	5.8	1.4
Pierre, S. Dak.[g]	1,006	14	3.7	25	0.8	24	2.1	2.9
Sioux City, Iowa[b]	676	19	8.0	8	6.0	12	6.3	2.0
Omaha, Nebr.	561	18	7.5	10	5.3	6,7	6.1	2.2
St. Joseph, Mo.	373	10	3.3	18	1.2	30,31	2.5	2.1
Kansas City, Mo.	280	21	9.5	13	6.9	31	7.7	2.6
Boonville, Mo.	191	20	11.1	30	6.3	5-7	8.4	4.8
Hermann, Mo.	95	24	15.2	23	4.8	9	9.5	10.4
Ohio River.								
Pittsburg, Pa	966	22	28.5	24	3.7	8	10.5	24.8
Davis Island Dam, Pa.	960	25	27.1	24	5.8	8,9	11.2	21.3
Wheeling, W. Va.	875	36	43.9	24	7.0	8-10	16.1	36.9
Parkersburg, W. Va.	785	35	47.8	26	8.1	11	19.4	39.7
Point Pleasant, W. Va.	708	36	51.2	27	8.2	11,12	22.1	43.0
Catlettsburg, Ky	651	50	56.0	27,28	10.8	11-13	26.2	45.2
Portsmouth, Ohio	612	50	57.3	28	12.2	13	27.9	45.1
Cincinnati, Ohio	499	45	61.4	29	15.0	11	31.3	46.4
Louisville, Ky.	367	24	36.3	30	7.3	11,12	15.5	29.0
Evansville, Ind	184	30	44.3	31	12.0	12	25.8	32.3
Paducah, Ky.	47	40	42.5	31	10.5	12	23.4	32.0
Alleghany River.								
Warren, Pa	177	7	7.6	24	1.7	5-12	3.9	5.9
Oil City, Pa	123	13	10.2	24	2.2	4-9	4.8	8.0
Parkers Landing, Pa.	73	20	14.0	24	2.2	7	5.8	11.8
Freeport, Pa.	26	20	25.3	24	4.5	7,8	10.0	20.8
Conemaugh River.								
Johnstown, Pa.	64	7	7.4	23	1.8	6,10,11	3.1	5.6
Red Bank Creek.								
Brookville, Pa.	35	8	10.5	23	0.4	2,3,6-12	2.1	10.1
Beaver River.								
Ellwood Junction, Pa.	10	14	13.2	23	1.2	11,12	3.2	12.0
Cumberland River.								
Burnside, Ky	434	50	12.5	29	2.8	12	6.2	9.7
Carthage, Tenn	257	30	18.3	30	3.0	11-13	7.8	15.3
Nashville, Tenn	175	40	24.0	31	4.3	12	10.9	19.7
Great Kanawha River.								
Charleston, W. Va.	61	30	19.5	31	3.8	7-11	7.2	15.7
New River.								
Hinton, W. Va.	95	14	7.6	31	1.7	5-13	2.6	5.9
Licking River.								
Falmouth, Ky.	30	25	17.6	21	2.0	11,12	7.0	15.6
Miami River.								
Dayton, Ohio	69	18	18.3	23	1.7	8	5.3	16.6
Monongahela River.								
Weston, W. Va	161	18	13.1	29	−1.5	12,13	1.4	14.6
Fairmont, W. Va	119	25	18.4	25	1.0	9-15	4.8	17.4
Greensboro, Pa.	81	18	21.2	25	7.7	10-16	10.8	13.5
Lock No. 4, Pa.	40	28	23.9	30	7.1	9,10	12.6	16.8
Cheat River.								
Rowlesburg, W. Va.	36	14	8.0	25	2.5	11-13	4.4	5.5

Heights of rivers above zeros of gauges—Continued.

Stations.	Distance to mouth of river.	Danger-line on gauge.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Youghiogheny River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Confluence, Pa.	59	10	8.1	25	1.4	11,12	3.8	6.7
West Newton, Pa.	15	23	10.9	24	0.8	8	3.9	10.1
Muskingum River.								
Zanesville, Ohio	70	30	35.9	24	9.0	5,6	15.6	26.9
Tennessee River.								
Knoxville, Tenn.								
Kingston, Tenn	614	29	10.8	31	1.0	12,13	2.3	9.8
Chattanooga, Tenn.	534	25	11.8	31	2.8	13,14	4.3	9.0
Bridgeport, Ala	430	33	6.0	31	1.4	12-14	2.6	4.6
Florence, Ala.	390	24	6.1	31	1.8	6-8,12	3.3	4.3
Johnsonville, Tenn.	220	16	13.6	31	3.3	10	6.2	10.3
Clinch River.								
Speers Ferry, Va.	156	20	7.9	30	0.2	11	1.2	7.7
Clinton, Tenn	46	25	14.0	31	4.0	14	5.6	10.0
Wabash River.								
Mount Carmel, Ill	50	15	27.0	30,31	6.0	9-11	15.5	21.0
Red River.								
Arthur City, Tex.	688	27	17.4	31	3.6	11	8.5	13.8
Fulton, Ark	565	28	22.5	18	2.8	13	11.2	19.7
Shreveport, La.	449	29	11.4	22,23	2.4	16	7.0	9.0
Alexandria, La	139	33	13.0	31	4.1	18,19	7.9	8.9
Atchafalaya Bayou.								
Melville, La	100*	31	29.4	31	22.7	19	26.0	6.7
Ouachita River.								
Camden, Ark.	340	39	20.4	17	6.2	12,13	10.4	14.2
Monroe, La	100	40	31.9	1	15.7	31	23.7	16.2
Yazoo River.								
Yazoo City, Miss.	80	25	20.7	1	10.2	17	13.6	10.5
Chattahoochee River.								
Columbus, Ga.	140	20	4.2	31	0.4	3	1.4	3.8
Flint River.								
Albany, Ga.	80	20	4.0	8,9	1.2	30,31	2.2	2.8
Cape Fear River.								
Fayetteville, N. C.	100	38	20.5	6	3.5	1-4	6.9	17.0
Columbia River.								
Umatilla, Oreg	270	25	7.0	9	−0.7	31	4.4	7.7
The Dalles, Oreg.	166	40	11.0	11	5.5	31	8.4	5.5
Willamette River.								
Albany, Oreg	99	20	5.5	1-4	3.5	30,21	4.3	2.0
Portland, Oreg	10	15	6.7	15	2.5	31	5.3	4.2
Edisto River.								
Edisto, S. C	75	6	3.8	18	2.2	5	3.1	1.6
James River.								
Lynchburg, Va.	257	18	6.3	31	0.7	16,17	1.5	5.6
Richmond, Va.	110	12	2.0	31	0.0	{3,4,10 / 16-19,21}	0.4	2.0
Alabama River.								
Montgomery, Ala	265	35	4.6	31	1.0	14	2.0	3.6
Selma, Ala.	212	35	5.6	22	1.2	2,14,15	2.2	4.4
Coosa River.								
Rome, Ga.	225	30	11.4	31	1.2	1-13	2.6	10.2
Gadsden, Ala	144	18	7.5	31	0.5	12,13	1.9	7.0
Tombigbee River.								
Columbus, Miss.	285	33	9.9	31	−1.3	13	2.9	11.2
Demopolis, Ala.	155	35	17.5	31	3.4	13,14	8.0	14.1
Black Warrior River.								
Tuscaloosa, Ala.	90	38	25.7	31	2.8	12,13	6.7	22.9
Pedee River.								
Cheraw, S. C.	145	27	16.2	31	1.2	3,13	3.7	15.0
Black River.								
Kingstree, S. C.	60	12	5.8	18	3.1	1	4.4	2.7
Lumber River.								
Fairbluff, N. C.	10	6	3.0	12-16	0.7	30	2.1	2.3
Lynch Creek.								
Effingham, S. C	35	12	8.5	14	3.5	29	5.3	5.0
Potomac River.								
Harpers Ferry, W. Va.	170	16	10.0	26	1.9	11-16	3.8	8.1
Roanoke River.								
Clarksville, Va	155	12	1.9	10	0.7	16,27,28	1.1	1.2
Sacramento River.								
Redbluff, Cal	241	23	9.3	1	0.9	27-31	2.6	8.4
Sacramento, Cal.	70	25	16.7	10	12.5	31	14.8	4.2
Santee River.								
St. Stephens, S. C.	50	12	7.1	10	1.2	3,4	4.1	5.9
Congaree River.								
Columbia, S. C.	37	15	4.1	31	1.2	25-29	1.7	2.9
Wateree River.								
Camden, S. C	45	24	17.0	31	2.9	14	5.4	14.1
Savannah River.								
Augusta, Ga	130	32	13.5	31	5.4	30	7.1	8.1
Susquehanna River.								
Wilkesbarre, Pa.	178	14	12.0	15	3.0	8	6.4	9.0
Harrisburg, Pa.	70	17	15.2	24,25	3.3	9,10	7.0	11.9
Juniata River.								
Huntingdon, Pa.	80	24	10.2	23	3.9	7-10	5.0	6.3
W. Br. of Susquehanna.								
Williamsport, Pa	35	20	21.0	24	2.8	7	7.3	18.2
Waccamaw River.								
Conway, S. C	40	7	3.3	10,11	1.5	2,22	2.3	1.8

*Distance to Gulf of Mexico. [a] Record for 24 days. [b] Record for 17 days. [c] Record for 19 days. [d] Record for 21 days. [e] Record for 22 days. [f] Record for 27 days. [g] Record for 25 days. [h] Record for 24 days.

SPECIAL CONTRIBUTIONS.

RECENT PUBLICATIONS.

By W. F. R. PHILLIPS, M. D., in charge of Library, Weather Bureau.

The following list of titles includes principally the annual and occasional publications that have been added to the library during the month ending April 7, 1898. Most of these works have been received in exchange for the publications of the Weather Bureau; a few have been obtained by purchase.

The numerous monthly and periodical publications are generally omitted because of lack of space.

Annales de l'Observatoire Royal de Bruxelles, publiées aux frais de l'état. Nouvelle série. Annales météorologiques. Tome III. 4°. P. 515 Bruxelles, 1895. Tome IV. 4°. P. 357 Bruxelles, 1895.

Annals of the Astronomical Observatory of **Harvard College**. Edward C. Pickering, Director. Vol. XLII. Part 1. Observations made at the **Blue Hill Meteorological Observatory**, Massachusetts, U. S. A., in the year 1896, under the direction of **A. Lawrence Rotch**, A. M. With appendices containing investigations of cloud forms, and of the air by means of kites. 4°. P. viii–128. Plates. Cambridge, 1897.

Annuaire de l'Observatoire Municipal de Montsouris [Paris] pour l'année 1898. (Analyse et Travaux de 1896). Météorologie, chimie, micrographie, applications à l'hygiène. P. xii–636 24°. Paris, 1898.

Atlas der Osterreichiscen Alpenseen mit unterstützung des hohen k.k. Ministeriums für Cultus und Unterricht herausgegeben von **Dr. Albrecht Penck**, Professor der Geographie an der Universität Wien und **Dr. Edward Richter**, Professor der Geographie an der Universität Graz. I Lieferung: Die Seen des Salz Kammergutes, 18 Karten, und 100 profile auf 12 tafeln. Hauptsächlich nach den lothungen von Hofrath Dr. Friedrich Simony, Em. Professor der Geographie an der Universität Wien entworfen und gezeichnet von Dr. Johann Müllner. Geographische Abhandlungen herausgegeben von Prof. Dr. Albrecht Penck in Wien. Band VI. Heft I. 15 x 18. Wien, 1895. II Lieferung: Seen von Karnthen, Krain, und Südtirol. 10 Karten und 32 profile auf 9 tafeln Hauptsächlich nach eigenen lothungen entworfen von Prof. Dr. Edward Richter. 15 x 18. Wien, 1896.

Aurora Australis by **H. C. Russell**, B. A., C. M. G., F. R. S. 8°. P. 8. Sydney, 1897.

Bemerkenswerthe Sturme X. Von Prof. Dr. **W. J. van Bebber**. Annalen der Hydrographie und Maritimen Meteorologie. Januar 1898.

Blue Hill Meteorological Observatory. A. Lawrence Rotch, Director. A study of **Special Cloud Forms**, by **Arthur E. Sweetland**. Reprinted from the Annals of the Astronomical Observatory of Harvard College. Vol. XLII. Part I. [11] p. Plate. 4°. Cambridge, 1897.

Blue Hill Meteorological Observatory. A. Lawrence Rotch, Director. Bulletin No. 2. 1898. Examples of the **Diurnal and Cyclonic Changes in Temperature and Relative Humidity** at Different Heights in the Free Air, by **H. Helm Clayton**. 4°. P. 4.

Blue Hill Meteorological Observatory. A. Lawrence Rotch, Director. **Exploration of the Air by Means of Kites**. I. Kites and Instruments by **S. P. Fergusson**. II. Results from the Kite Meteorographs and Simultaneous Records at the Ground. III. Discussion of the Observations, by **H. Helm Clayton**. Reprinted from the Annals of the Astronomical Observatory of Harvard College. Vol. XLII. Part I. 4°. P. 128. Plates. Cambridge, 1898.

Boletin de **Agricultura e Industrias** publicado por la Secretaria de Fomento, Colonización é Industria de la Republica **Mexicana**. Año VI. Núm. 11. Mayo de 1897. 12°. P. iv–312. Mexico, 1897. Num. 42. Junio de 1897. 12°. P. iv–233. Mexico, 1897.

Boletin de la **Sociedad Geografica de La Paz**. Bolivia, 1898. Año I. Tomo I. No. I. 8°. P. 159. La Paz.

Bulletin Mensuel de "**Biarritz Association**" **Societe des Sciences, Lettres, et Arts**. Janvier 1898.

Commission Météorologique de la Gironde. **Observations Pluviometriques et Thermometriques** faites dans le Département de la Geronde de Juin 1896 à Mai 1897. Note de **M. G. Rayet**, Président de la Commission Météorologique Départementale. Append. au tome III, 5me série des Mem. de la Soc. des Sc. Phys. et Nat. de Bordeaux. 69 p. 8°. Bordeaux 1897.

Cumulative Index to a selected list of periodicals. Authors, subjects, titles, reviews, portraits. Second annual volume. 1897. Edited and published by the **Public Library, Cleveland, Ohio**, U. S. A. P. 635. 4°. Cleveland, 1898.

Department of Public Instruction. Meteorology of New South Wales. **Results of Rain, River, and Evaporation Observations** made in New South Wales, during 1896, with maps and diagrams, by **H. C. Russell**, B. A., C. M. G., F. R. S., Government astronomer. 8°. P. liii–209. Sydney, 1897.

Deutches Meteorologisches Jahrbuch fur 1896. Beobachtungs-System der Deutchen Seewarte. Ergebnisse der Meteorologischen Beobachtungen an 10 Stationen II. Ordnung und an 48 Signalstellen, sowie Stündliche Aufzeichnungen an 4 Normal Beobachtungen Stationen. Jahrgang XIX. (Einundzwanzigster Jahrgang der Meteorologischen Beobachtungen in Deutschland). Herausgegeben von der Direktion der Seewarte. 4°. P. viii–189 Hamburg, 1897.

Die **Hauptwetterlagen in Europa**. Von Prof. Dr. **W. J. Van Bebber**, Abtheilungsvorsteher der Deutschen Seewarte. 4°. P. 16. Annalen der Hydrographie und Maritimen. Oktober, 1897.

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Indian Meteorological Memoirs. Being occasional discussions and compilations of meteorological data relating to India and the neighboring countries. Published by order of his excellency, the Viceroy and Governor General of India in council, under the direction of **J. Eliot**, M. A., F. R. S., C. I. E., Meteorological Reporter to the Government of India. Vol. VII. Meteorological observations recorded at the **Trevandrum Observatory** during the years 1853 to 1864, under the superintendence of the late **J. Allan Broun**, Esq., F. R. S., edited by J. Eliot, Meteorological Reporter to the Government of India. Part VII. Force of Wind. June, 1853—April, 1856. Velocity of Wind. May, 1856—December, 1864. 4°. P. 139. Simla, 1897,

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Minerva. Jahrbuch der Gelehrten Welt. Herausgegeben von **K. Trubner**. Siebenter Jahrgang 1897-1898. P. xxiv–1130. 24°. Strassburg, 1898.

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The same, año de 1897. 4°. P. 60 and charts, Habana, 1898.

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Report of the Condition and Progress of the **G. V. Juggarow Observatory**, Vizagapatam, including the results of observations for the year 1896. Published by the General Committee, G. V. Juggarow Observatory, Vizagapatam. 8°. P. 38 and charts. Calcutta, 1897.

Report of the **Meteorological Council**, for the year ending March 31, 1897, to the President and Council of the Royal Society. P. 123. 8°. London, 1897.

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Transactions of the **Astronomical and Physical Society of Toronto**, for the year 1897, including eighth annual report. P. x–154–6. 8°. Toronto, 1898.

The **7-Day Auroral Period and the Moon**. By **H. Helm Clayton**. 8°. Pp. 81–87. From the American Journal of Science. Vol. V. 1898.

[U. S.] Department of the Interior, U. S. Geological Survey. Charles D. Walcott, Director. Report of Progress of **Stream Measurements** for the Calendar Year 1896. By **Author Powell Davis**. Extract from the Eighteenth Annual Report of the Survey, 1896–1897. Part IV—Hydrography. P. 408. 4°. Washington, 1897.

[U. S.] **Hydrographic Office**. No. 100. Sailing Directions for the Gulf and River St. Lawrence. Second edition. 8°. P. viii–413. Washington, 1897.

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Year-Book of the **Royal Society** [London] 1897–1898. 8°. P. 172. London, 1898.

Zusammenstellung der Monats-und Jahres-Mittel der Privat-Wetterwarte für die "**Isis**" zu Meissen im Jahre 1897. Bearbeitet von **Karl Gebauer**. 8°. P. 7 und Karte. Meissen, 1898.

METEOROLOGICAL OBSERVATIONS AT PORT AU PRINCE, HAYTI.

Through the kind cooperation of Prof. T. Scherer of Port au Prince, Hayti, the meteorological observations taken by him at 7 a. m., local time, or 11:49 a. m., Greenwich time, are communicated in manuscript for early publication in the MONTHLY WEATHER REVIEW. By entering these on the monthly and annual charts, published by the Weather Bureau, we obtain an important extension southeastward of our field of study. The observations are taken $1^h\ 11^m$ earlier than those of the Weather Bureau telegraph system. The original reports are in metric measures; the conversions are by the Editor.

The barometer is 119 feet above sea level; its readings have been corrected by Professor Scherer for temperature, elevation, and gravity, this latter correction is —0.064 inch; the thermometers are 6.7 feet above ground; the rain gauge, 7.2 feet above ground. The wind velocity is given in miles per hour.

The position of Port au Prince, Hayti, is latitude 18° 34′ N., longitude 72° 21′ W., or $4^h\ 49^m$ west of Greenwich. Additional records for this station are published in the annual volume of the Central Meteorological Institute at Vienna.

Observations at Port au Prince, Hayti.

MARCH, 1898.

Date.	Barometer reduced.	Temperature. Air.	Temperature. Dew-point.	Rel. humidity.	Wind. Direction.	Wind. Velocity.	Clouds. Kind.	Clouds. Amount.	Clouds. Direction.	Preceding 24 hours. Total rain.	Preceding 24 hours. Temperature. Max.	Preceding 24 hours. Temperature. Min.
	Inches	°	°	%						*Inch.*	°	°
1	29.96	68.0	60.3	90	e.	2	cs	3	.....	0.00	85.5	66.9
2	30.02	72.1	60.6	75	ese.	4	cs	1	.....	0.00	91.4	70.3
3	30.00	72.5	60.4	83	ese.	4	ak	1	sw.	0.00	91.4	70.9
4	30.04	73.8	55.6	62	ene.	4	k	9	.. ..	0.59	91.2	71.6
5	30.06	71.2	63.7	91	.....	0	cs	8	.....	0.32	86.0	69.8
6	30.04	72.3	60.6	83	.....	0	s	1	.....	0.23	87.4	69.3
7	29.98	73.6	60.6	76	.....	0	ck	6	w.	0.63	86.0	70.0
8	29.95	71.6	66.0	96	ne.	2	n	10	.....	0.00	84.4	69.8
9	29.93	72.9	64.9	88	.....	0	k	8	.....	0.16	85.3	70.3
10	29.96	69.6	62.4	92	e.	2	.....	0	.....	0.00	85.6	68.0
11	29.95	72.3	56.3	67	se.	9	....	0	.....	0.00	85.6	67.6
12	29.96	74.8	54.0	56	e.	9	k	2	.....	0.00	86.4	69.8
13	30.00	68.0	50.2	58	e.	7	.....	0	.....	0.00	84.7	68.0
14	30.01	67.3	48.6	54	ne.	11	.....	0	.....	0.00	85.8	66.2
15	30.04	67.3	50.7	61	se.	4	cs	1	.....	0.00	86.5	64.9
16	30.06	71.7	52.5	59	se.	7	.....	0	.....	0.00	87.3	67.8
17	30.04	70.7	53.6	61	ese.	9	.....	0	.....	0.00	89.1	69.1
18	30.06	70.9	53.8	71	se.	11	.....	0	.....	0.00	87.8	68.5
19	30.10	70.2	54.9	68	e.	7	.....	0	.....	0.00	89.4	68.5
20	30.13	71.6	54.0	62	se.	9	.....	0	.....	0.00	89.6	68.5
21	30.12	72.0	51.8	55	e.	9	.....	0	....	0.00	90.5	70.0
22	30.11	69.4	57.6	78	ese.	2	.....	0	.....	0.00	89.8	66.6
23	30.12	73.6	57.4	67	ese.	2	.....	0	.....	0.00	93.6	69.3
24	30.12	72.0	57.2	70	ese.	2	k	6	.....	0.00	89.1	69.1
25	30.10	71.4	59.5	78	.....	0	.....	1	.....	0.00	88.7	68.2
26	30.10	75.2	54.0	55	ese.	7	.....	0	.....	0.00	89.2	73.4
27	30.05	70.3	51.1	56	se.	4	....	0	.....	0.00	90.5	67.5
28	30.01	74.1	54.0	57	.....	0	k	2	ne.	0.00	88.3	70.7
29	30.04	73.9	54.1	58	se.	9	s	1	.....	0.00	88.5	69.6
30	30.06	72.1	52.0	57	se.	11	k	10	wnw.	0.00	88.3	70.3
31	30.06	72.0	58.3	72	ese.	7	cs	4	.....	0.00	88.2	68.9
Sum.	.....	.....	.....	.....	.....	.....	.....	...	.....	1.92	.....	.....
Means.	30.04	71.6	56.5	69.5	.....	.....	.....	2.5	.....	.....	88.2	69.1

MEXICAN CLIMATOLOGICAL DATA.

Through the kind cooperation of Señor Mariano Bárcena, Director, and Señor José Zendejas, vice-director, of the Central Meteorologico-Magnetic Observatory, the monthly summaries of Mexican data are now communicated in manuscript, in advance of their publication in the *Boletin Mensual;* an abstract translated into English measures is here given in continuation of the similar tables published in the MONTHLY WEATHER REVIEW during 1896. The barometric means have not been reduced to standard gravity, but this correction will be given at some future date when the pressures are published on our Chart IV.

Mexican data for March, 1898.

Stations.	Altitude.	Mean barometer.	Temperature. Max.	Temperature. Min.	Temperature. Mean.	Relative humidity.	Precipitation.	Prevailing direction. Wind.	Prevailing direction. Cloud.
	Feet.	*Inch.*	° *F.*	° *F.*	° *F.*	%	*Inch.*		
Aguascalientes	6,106	23.87	82.0	42.8	66.2	32	0.00	sw.	w.
Arteaga (Coahuila)	.....	.....	92.1	35.8	70.7	.....	0.12	.....	.....
Barousse (Coahuila)	5,414	.....	86.4	27.7	67.8	.....	0.71	.....	.....
Colima (Sem.)	.....	.....	.....	.....	79.9	.. ....	.....	.....	.....
General Cepeda	.....	.....	97.7	29.3	67.5	.....	1.69	.....	.....
Leon	5,934	24.25	86.5	37.6	65.3	32	T.	wsw.	wsw.
Linares (New Leon)	1,188	28.70	94.3	48.2	68.9	75	1.01	se.	.....
Magdalena (Sonora)	4,948	.....	.....	.....	60.8	.....	0.24	ne.	n.
Merida (Yucatan)	50	29.93	96.8	57.6	78.8	57	0.53	ese.	se.
Mexico (Obs. Cent.)	7,472	23.02	84.2	39.2	62.2	44	0.09	nw.	sw.
Morelia (Seminario)	6,401	23.93	85.8	43.0	65.1	52	0.28	sw.	w.
Oaxaca	5,164	25.04	91.0	43.0	71.6	51	0.36	sw.	sw.
Parros (Coahuila)	3,986	.... ..	90.0	29.3	68.7	.....	0.59	.....	.....
Saltillo (Col. S. Juan)	5,399	24.73	90.5	27.9	63.9	69	0.35	n.	n.
San Isidro (Hac. de)	.....	.....	78.8	54.5	.....	.....	.....	w.	.....
San Luis Potosi	6,202	24.09	83.8	37.6	64.6	60	0.25	e.	w.
Silao (Guanajuato)	6,063	24.23	82.9	46.6	67.6	48	T.	nw.	w.
Torreon (Coahuila)	3,720	.. ....	94.1	39.2	70.9	.. ...	0.08	.....	... .
Tuxpan (Vera Cruz)	.....	.....	93.2	48.2	68.4	71	0.06	se.	ne.
Tuxtla (Gutierrez)	1,864	28.10	99.7	54.7	78.3	61	T.	.....	.....
Zacatecas	8,015	22.48	83.1	28.8	60.4	38	0.08	.....	.....
Zapotlan (Seminario)	5,078	.....	86.4	45.7	70.0	45	0.00	.....	.....

OBSERVATIONS AT HABANA, CUBA.

Through the kindness of the Director of the Belen Observatory, Rev. L. Gangoiti, the observations made at that station at 1 p. m., Greenwich mean time, or 8 a. m., seventy-fifth meridian time, are communicated to the Weather Bureau promptly by mail, and are herewith published for general use. The position of the observatory is N. 23° 8′ 14″, W. 76° 9′ 42″, from San Fernando, or 69° 57′ west from Greenwich; altitude of the barometer 24.347 meters (79.7 feet); the barometric readings have been reduced to sea level and converted into English measures by the Director. The correction for local gravity has not been applied; so far as it concerns latitude, the correction for 30 inches of mercury is —0.054 inch. The clouds are observed with much minuteness; two kinds are frequently recorded under the general headings "upper" or "lower"; in these cases the two kinds are printed in the accompanying table in the same column but separated by a semicolon; their respective directions are also separated by a semicolon. The rainfall is given for the twenty-four hours ending with 1 p. m., Greenwich time. Most of these observations seem to be read off from the records of the Secchi meteorograph, but the directions of the clouds have apparently been observed accurately by the use of the reflecting nephoscope. The kinds of clouds are indicated in the accompanying table, by the same letters as those used in the original manuscript, which undoubtedly agree with the following paragraph quoted from the annual volume published by the same observatory:

The clouds are classified as upper and lower; among the upper clouds the following are included, arranging them in the order of decreasing altitude from above downward, viz: *c*, cirrus; *ck*, cirro-cumulus; *cs*, cirro-stratus; *ka*, alto-cumulus. Among the lower clouds the following are included: *kb*, lower cumulus; *sk*, strato-cumulus; *s*, stratus, and *n*, nimbus. The false cirrus is not included; the lower cirro-cumulus is included with the alto-cumulus; the cumulo-nimbus is included with the strato-cumulus.

Meteorological data, Habana, Cuba, March, 1898.

Date.	Barometer reduced to sea level.	Temperature of air.	Relative humidity.	Wind.		Upper clouds.			Lower clouds.			Total rainfall.
				Direction.	Velocity.	Kind.	Am't.	Direction.	Kind.	Am't.	Direction.	
	Inches	°	%		*Miles*							*Inch*
1....	30.05	63.9	54	nne.	10	k	2	nne.	.....	0	....	0.06
2....	30.08	61.2	83	ne.	1	cs	F.	wsw.	.....	0	.....	0.00
3 ...	29.93	65.1	91	wsw.	15	.....	0	.....	n	10	.....	0.76
4....	30.04	73.9	76	wnw.	7	k	3	sw.	sk; s	7	wnw.	0.12
5....	30.21	68.2	67	n.	11	c; cs; k	1	sw.; n.	k; sk	5	nne.	0.02
6....	30.19	63.9	88	.....	0	cs	4	wsw.	k; sk	5	ene.; —	0.08
7 ...	30.11	65.3	83	.....	0	k	5	w.	k; sk, s	2	ene.;nne.	0.01
8....	30.01	64.4	84	ne.	1	cs; k	5	—; w.	sk	F.	.....	0.00
9....	30.00	66.7	87	e.	2	k	2	ne.	sk	1	.....	0.03
10....	30.06	64.6	82	.....	0	k	F.	nw.	k; sk	1	ene.; w.	0.00
11....	30.03	64.4	84	ne.	1	.....	0	.....	k; sk	F.	ene.; —	0.00
12....	30.03	71.4	77	e.	12	.....	0	.....	sk	F.	.....	0.00
13....	30.07	68.0	72	ene.	1	cs; k	2	nw.; ese.	k	F.	.....	0.00
14....	30.09	67.5	74	ese.	8	k	7	ese.	.....	0	.....	0.00
15....	30.13	67.1	81	e.	5	.....	0	.....	.....	0	....	0.00
16....	30.16	68.5	79	e.	4	.....	0	.....	k	F.	.....	0.00
17....	30.19	68.7	83	ne.	0	k	F.	ene.	sk	F.	.....	0.00
18....	30.20	69.8	75	ene.	2	.....	0	.....	k; sk	F.	ene.; —	0.00
19....	30.20	69.1	73	e.	6	cs	F.	.....	k; sk	F.	—; —	0.00
20....	30.21	70.5	70	e.	4	k	4	e.	.....	0	.....	0.00
21....	30.19	69.8	80	ene.	0	k	F.	.....	sk	F.	.....	0.00
22....	30.16	72.1	75	ene.	5	.....	0	... .	....	0	.....	0.00
23....	30.14	72.5	73	ese.	8	k	F.	ese.	....	0	.....	0.00
24....	30.14	70.3	89	ene.	5	.....	0	.....	.....	0	.....	0.00
25....	30.18	72.7	76	e.	10	.....	0	.....	.....	0	.....	0.00
26....	30.22	71.1	77	e.	7	.....	0	.....	k	F.	ene.	0.00
27....	30.18	70.3	77	e.	1	.....	0	.....	k; sk	1	ene.	0.00
28....	30.15	73.4	72	ene.	8	.....	0	.....	k; sk	1	ese.; —	0.00
29....	30.13	72.0	68	e.	12	cs; k	1	nw.; —	sk	F.	.....	0.00
30....	30.13	68.9	71	e.	1	c; cs	1	wnw.	sk	F.	.....	0.00
31....	30.11	68.5	77	ese.	1	.....	0	.....	.....	0	.....	0.00
Sum.	.....	.....	....	.....	.....	.....	....	.....	.....	....	.....	1.08

OBSERVATIONS AT HONOLULU, REPUBLIC OF HAWAII.

Through the kind cooperation of Mr. Curtis J. Lyons, Meteorologist to the Government Survey, a copy of the daily record at Honolulu is communicated to the Weather Bureau in advance of its official publication, and is herewith printed, as a special contribution, for the convenience of those who are studying the relations of the storms and weather of the United States to those of adjacent countries, with a view to long-range, seasonal predictions.

Meteorological observations at Honolulu, Republic of Hawaii.

The station is at 21° 18′ N., 157° 50′ W.; altitude 50 feet.
Pressure is corrected for temperature and reduced to sea level, but the gravity correction, —0.06, is still to be applied.
The average direction and force of the wind and the average cloudiness for the whole day are given unless they have varied more than usual, in which case the extremes are given. The scale of wind force is 0 to 10. Two directions of wind, or values of wind force, connected by a dash, indicate change from one to the other.
The rainfall for twenty-four hours is given as measured at 6 a. m. on the respective dates.

MARCH, 1898.

March, 1898.	Pressure at sea level.			Temperature.					Relative humidity.			Wind.		Cloudiness.	Rain measured at 6 a. m.
	6 a. m.	3 p. m.	9 p. m.	6 a. m.	2 p. m.	9 p. m.	Maximum.	Minimum.	7 a. m.	2 p. m.	9 p. m.	Direction.	Force.		
	Ins.	*Ins.*	*Ins.*	°	°	°	°	°	%	%	%				*Ins.*
1.	30.00	29.93	29.98	60	72	62	73	60	84	57	84	n-w.	1	1-3	0.00
2.	30.03	29.97	30.13	60	74	66	74	60	79	30	57	n.	1-5	6-0	0.00
3.	30.20	30.13	30.22	65	71	68	73	65	61	40	60	nne.	6	3	0.00
4.	30.25	30.15	30.23	67	68	67	71	65	71	71	67	ne.	4	7	0.00
5.	30.17	30.10	30.15	66	71	68	73	64	71	60	67	ene.	3-5	6	0.02
6.	30.08	30.02	30.10	64	72	69	74	62	80	63	70	ne.	4	7	0.04
7.	30.08	30.04	30.12	64	73	69	74	61	76	59	72	ne.	4	7	0.17
8.	30.09	30.05	30.12	66	72	70	74	64	67	69	72	ene.	4	4	0.12
9	30.08	30.04	30.11	66	70	68	72	63	72	76	76	ne.	5	5	0.49
10.	30.08	30.04	30.10	66	69	69	74	64	78	76	76	ene.	5	8	0.35
11.	30.07	30.04	30.05	67	73	71	74	65	76	69	69	ene.	4-5	8-10	0.32
12.	30.04	30.00	30.01	69	68	71	71	66	82	78	77	ne.	1-6	10	0.08
13.	29.93	29.86	29.96	68	77	72	78	65	95	70	82	n-wsw.	1-3	5-2	1.07
14.	29.93	29.90	29.97	67	74	70	74	66	97	80	80	sw.	0-1	10	0.23
15.	29.98	29.90	30.00	70	76	70	77	69	95	78	93	s.	1-4	10	0.26
16.	29.94	29.89	29.96	70	76	73	77	67	90	83	93	se-s.	2-3	10-5	0.53
17.	29.96	29.90	30.00	71	74	72	76	70	90	90	90	sw.	2	8	0.13
18.	30.00	29.98	30.08	68	76	69	77	67	93	78	89	sse-sw.	3-1	6-10	0.04
19.	30.06	29.99	30.07	67	77	69	77	66	98	74	97	s-n.	1	6-10	0.33
20.	30.07	30.01	30.11	67	72	66	75	67	93	80	97	ne.	0-1	10	0.53
21.	30.07	30.04	30.09	67	73	70	75	65	93	69	79	ne.	0-1	10	2.35
22.	30.07	30.03	30.10	65	73	71	75	63	95	77	79	ne.	3	8	0.65
23.	30.05	30.00	30.06	69	73	71	74	69	89	74	77	ne.	4	10	0.17
24.	30.01	29.96	29.99	69	68	67	74	62	77	90	85	nw-ne.	0-3	10	0.27
25.	29.96	29.93	30.00	69	75	70	75	65	81	70	77	ne.	3	3-7	3.90
26.	29.99	29.95	30.03	69	74	70	77	69	82	74	85	ne-se.	3-2	5-10	0.10
27.	30.04	30.00	30.00	70	75	72	77	67	86	74	82	ene.	3	10-5	0.39
28.	30.09	30.06	30.11	70	73	72	75	70	86	72	71	ene.	5-6	10-8	0.04
29.	30.10	30.05	30.13	69	74	71	75	67	74	64	68	ne.	5	7-10	0.06
30.	30.13	30.06	30.17	69	71	71	73	69	68	71	68	ne.	5	10-6	0.03
31.	30.15	30.09	30.19	68	72	70	74	69	69	63	64	ne.	6	4-6	0.08
	30.05	30.00	30.08	67.1	73.0	69.5	74.6	65.2	82.5	70.3	77.5	.....	.....	.....	12.70

Mean temperature: 6+2+9+3 is 69.9°; extreme temperatures, 78° and 60°.

CUMULUS CLOUDS OVER A FIRE.

By R. DEC. WARD (dated April 1, 1898).

An interesting observation of the formation of small cumulus clouds over a fire was made by the writer on October 29 last, at the southern station of the Harvard College Observatory, at Arequipa, Peru (altitude 8,050 feet above sea level). At about 3:45 p. m. on that day there was observed behind the western flank of Mount Charchani (20,000 feet above sea level), and about 15 miles or so away, a column of smoke rising from a considerable fire of brushwood behind the mountain. The altitude above sea level of the fire was about 14,000 feet, judging by its relation to the height of the mountain. As the writer was looking at the smoke, which was rising to a considerable height, he noticed the formation of a small cumulus cloud directly over the smoke column, and approximately at a height of 17,000 or 18,000 feet above sea level, or 3,000 to 4,000 feet above the fire. The sky at this time was clear, except a trace of cirrus in the west and southwest. The wind at Arequipa was west about 15 miles an hour.

The cloud was only a fragment, and disappeared very soon, drifting to the southeast. It was succeeded by another small cumulus, which again disappeared within five minutes. The smoke column was ascending apparently near vertically, but its top was blown somewhat toward the southeast. Succes-

sive cloudlets, rather fracto-cumulus than true cumulus, formed over the smoke, none of them lasting more than three minutes, and most of them only one minute. Eight distinct cloudlets were seen thus to form and dissolve within the space of half an hour, at the end of which time the smoke had disappeared.

At Arequipa the wind, as stated above, was west 15 miles. Where the smoke was (14,000 feet) it was nearly calm. At the level of the cirro-cumulus clouds there was a strong current from west-northwest. Although the smoke column was small, evidently the conditions were favorable for cloud formation. The whole thing, however, was on a miniature scale.

Cumulus clouds over fires were described by Espy in his Fourth Meteorological Report. A recent case was noted by the writer in Science, January 8, 1897, pp. 60–61.

THUNDERSTORMS IN NEW BRUNSWICK, 1897.

By SAMUEL W. KAIN, Librarian of the Natural History Society of New Brunswick (dated St. John, April 4, 1898).

During the year 1897 I made some observations on the thunderstorms which occurred in this Province and perhaps the results may be of interest.

Before examining the record, however, it may be well to say a few words in a general way about thunderstorms.

Cause.—Russell says "thunderstorms are due to a rapid decrease of temperature with ascent in the air, and the presence of a great deal of moisture in the lower air."

The passage of a thunderstorm is so well known that it is hardly necessary for me to give a description.

In St. John the coming of a thunderstorm is preceded by cumulo-nimbus clouds appearing from the northwest during the afternoon or early in the evening. During 1897 thunder was recorded at St. John on the following dates:

Date.	A. M. or P. M.	Remarks.	Date.	A. M. or P. M.	Remarks.
May 21...	p. m.	Rainfall, 0.62.	Aug. 6..	p. m.	
June 16..	p. m.		Aug. 8..	p. m.	Distant.
June 18..	p. m.	Rainfall, 0.23.	Aug. 9..	p. m.	Slight.
June 20..	a. m.	Rain all day.	Aug. 15.	p. m.	Distant.
June 28..	p. m.		Aug. 17.	p. m.	Lightning; no thunder.
July 9 ..	p. m.	Distant.	Sept. 9..	p. m.	Rainfall, 0.36.
July 30 ..	a. m.	Rainfall, 0.57.	Sept. 10.	p. m.	Lightning; no thunder.
Aug. 1...	p. m.		Sept. 21.	a. m.	Rainfall, 0.48.
Aug. 4...	a. m.	Rainfall, 0.510.			

Of these storms 13 occurred in the afternoon and 4 in the morning. Two storms were reported from the Bay of Fundy, both at night. The storm of August 1 was the heaviest observed at St. John during the year.

Barometer.—The barometer falls on the approach of a storm. The highest barometer immediately before a storm was 30.06, on September 9; the lowest, 29.526, on June 28. On the arrival of the wind squall the barometer rises. On September 21 it rose from 29.6 to 29.64, or 0.04; on June 28 it rose from 29.526 to 29.586, or 0.06, and on June 16 it rose from 29.65 to 29.68, or 0.03. After the wind dies out the barometer falls and then rises gradually.

Temperature.—The temperature before these storms was in no case high. Prof. W. M. Davis, in his excellent book on meteorology, says that "the temperature preceding the storm is, as a rule, oppressively high." The highest temperature recorded just before a thunderstorm at St. John in 1897 was 70° F., on August 1. This was the heaviest storm of the year. The lowest temperature was 47° F., on May 1. The temperature preceding the storm of January 23, 1898, was only 18°.

When the wind squall arrives with rain the temperature falls slightly. During the storm of August 1, the thermometer fell from 70° to 67.3°, or 2.7°. In warmer climates the fall is sometimes from 10° to 20°.

Wind.—The wind before storms at St. John has, in nearly all cases, been shifting from southeast, southwest, and south, and then blows steadily from the northwest on arrival of the storm. All the storms came from the northwest except the great storm of August 1, which was from the northeast. It was a dead calm when this storm broke on the city.

The storms of August 8 and 15 were noticeable for the fact that while the heavy thunder clouds were rapidly advancing from the northwest the wind was blowing steadily from the southeast.

Rainfall.—The rainfall from some of these storms was heavy. On May 21 it was 0.62, on August 4 it was 0.510, on September 21 it was 0.48, and on August 1 it was 0.570.[1]

During the storm of June 18 the heaviest clap of thunder was followed by hail. During the storm of August 6 hail fell at Loch Lomond, and Mr. C. H. Jackson tells me that the hailstones were large and rebounded as high as four feet from the platform in front of the Log Cabin Fishing Club. At Tower Hill and Oak Bay the hailstones did some damage to the crops.

No hail fell in St. John in the storm of August 9, but at Upper St. Davids, Charlotte County, large hailstones fell, breaking glass in the windows of a church, and on the same day at Meadows, Pomerey Ridge, Scotch Ridge, Tower Hill, Baillie, and Moores Mills, the hail did considerable damage to the crops. In some parts of Albert County on the same day the crops suffered considerable damage from hail.

Cloudburst.—The heavy downpour of rain known as a cloudburst is supposed to occur only in the distant west, but there can be no doubt that we had an exhibition of this unwelcome phenomenon in the great storm of August 1. It occurred near the premises of Mr. Edward L. Price, about 6 miles southwest of Sussex Station, about 3 o'clock in the afternoon. A correspondent tells me that the storm broke over the settlement with great violence. The lightning was intensely vivid, the thunder terrific, and the rain was indeed a cloudburst. The area affected was small, but great damage was done. The soil was scooped from the hillside, and a great scar, which can be seen at a considerable distance, remains as a lasting memorial of the visitation. The flood swept down the slope to the meadow lands and emptied into a water course known as the Burying Ground Brook, which leads to the cemetery at Upper Corner. Every farm bordering on the brook was injured. A number of small bridges were wrecked, a beautiful field with growing crop was destroyed by a landslide, a fine field of corn was covered with gravel and débris, and other standing crops were swept away. The damage was as follows:

Bridges and roads	$400 00
Hay, oats, and other crops	2,000 00
Total	2,400 00

This estimate is based upon figures supplied by Messrs. G. H. Wallace, E. L. Price, and Frank Tufts, and if anything the loss is underestimated. The storm seemed to be confined to a narrow strip of land about 1 mile wide and 3 in length, stretching from McGinn settlement toward the Sussex cemetery. The greater part of the rain fell in ten minutes.

At Sussex there were thunder and the usual shower, but no indication that such a rainfall had occurred so close at hand.

Thunder was recorded in New Brunswick during 1897 on thirty-three days, divided among the months as follows:

March	1	September	3
May	3	October	0
June	8	November	2
July	7		
August	9	Total	33

[1] This text and the date in the above table appear to be slightly discrepant.—ED.

August leads closely, followed by June and July. Now, although thunder was recorded on this number of days, it must not be supposed that every record is a separate storm. Thunderstorms move at a rate of from 25 to 50 miles an hour, and the same storm may be recorded at Frederickton, Oromocto, Gagetown, St. John, and Point Lepreau. A careful analysis of the record leads me to the conclusion that there were 24 individual storms; and even of these at least one-half would be more properly termed thunder showers.

In this connection it may be mentioned that thunderstorms are of great frequency in equatorial regions, but are not so frequent in northern latitudes. In Java the average for a year is 97; in France, 29; in Finland, 2; in Iceland, 1.

In the rainless area of Peru no thunder is ever heard, while at Pueblo, in Mexico, in summer there is a thunderstorm every afternoon from 2 to 3 o'clock. (Russell.)

Thunder can be heard about 10 miles; lightning can be seen about 200 miles. Thunder and lightning have always been objects of fear, and a recent investigator found "that of 298 classes of objects of fear to which 1,707 persons confessed, thunder and lightning lead all the rest."

Lightning is a powerful destructive agent. Dr. Robert Bell, of the Geological Survey, considers lightning the commonest cause of forest fires, and supposes that such fires took place even in Pleistocene times. I am not aware, however, that this view is generally held. In our own time the destruction of life and property by this means is larger, perhaps, than is generally supposed. From 1880 to 1890 in the United States there were killed annually in this way 200 persons. In the eight years ending 1892 the fire losses due to lightning amounted to $12,663,835. These figures are quoted by McAdie from the "Chronicle Fire Tables," and he considers them reliable.

I will now, as briefly as I can, present a statement of the damage done in this province during 1897.

Persons struck by lightning.—August 6, 2 p. m.—Joseph Wheaton, aged fourteen, killed in a hayfield at Middle Sackville. This was the only death from this cause during the year.

July 9, p. m.—Little girl disrobed and dress torn to tatters at St. George; not otherwise injured. She was playing on a swing, and the tree to which it was attached was shattered.

July 24.—Man knocked down and stunned by "ball lightning" at McAdam, but there were no serious results.

August 1.—A young man slightly burned on the neck and three other persons received slight shocks in a house which was struck in Carleton.

At Lepreau three young men were stunned and slightly burned. They were sitting in a room close to the telegraph office.

September 10.—A man living on the Buctouche road, near Richibucto, was struck on the head and severely cut. The current passed through a bench on which he was sitting and killed a dog and cat lying beneath.

Damage to property.—The damage to property by thunderstorms was considerable, as the following table will show:

	Loss.
Barns (15)	$3,000
Dwellings (7)	450
Bridges and roads	400
General merchandise	100
Telegraph and telephone plant	250
Cattle killed	125
Horse killed	75
Hay, oats, etc. (in barns)	3,350
Standing crops	3,200
Total	10,950

The greatest destruction was caused by lightning where the stroke resulted in fire; rain did considerable damage, and the hail which fell on August 6 and 9 also caused considerable loss to farmers. The following table shows the amount of damage caused by each of these agencies:

	Loss.
Lightning (where fire resulted)	$6,950
Lightning (mechanical)	400
Rain	2,400
Hail	1,200
Total	10,950

From this statement it will be seen that the loss resulting from these storms fell nearly altogether upon our farmers. The losses were largely confined to barns and their contents.

This is what happens in other places, and it shows that a farmer will do well to keep his barns insured. Some insurance policies make no provision for loss by lightning; others pay losses when fire results from the lightning.

Any insurer can have a provision inserted, without extra charge, in his policy protecting the property insured, whether fire results from the lightning stroke or the damage is mechanical, and it would be wise for farmers to bear this in mind when making insurance contracts.

I wish to thank numerous correspondents for aid received in the preparation of this paper, and especially Mr. D. L. Hutchinson, to whom I am indebted for much information.

UPPER CLOUDS AND WEATHER CHANGES.

By GEORGE W. RICHARDS, Voluntary Observer (dated Mapleplain, Minn.).

Referring to the MONTHLY WEATHER REVIEW for May, 1897, page 212, I may say that I have made something of a study of the upper clouds in their relation to the weather of this section, and will mention a few of my resulting rules.[1]

(A) During a cold snap, more especially during the winter season, near the close of a period of clear weather with northwest wind, if the northwest wind becomes very light or nearly calm, when the barometer has about reached its greatest height, either here or to the northward of us, with an area of cirrus and perhaps cirro-stratus covering the sky in the southwest, but moving toward the southeast or east-southeast in the morning, as in Fig. 1, Chart XII, for the first day, *then* the northwest or north wind will become nearly calm, and by the evening will turn to the northeast and perhaps east, and will, almost certainly, be followed by a moderate snowstorm that night or the next day with east to southeast winds.

By the evening of the first day, although the cirrus area is moving southeastward, the bank of clouds still has a tendency to lie farther northward, as will be seen in Fig. 2, and some of the wind will be in the northeast; but this is not the genuine northeast storm, and the snowfall is not nearly so heavy as in that. The wind (see Fig. 3) may be quite heavy from southeast during the night, and remain southeast the next morning. (See note at the end.)

(B) The genuine northeast storm is preceded by northeast wind with but slight change. Sometimes the cirrus with its haze covers the sky in the successive positions shown by Figs. 4, 5, 6.

If the cirrus area in the first afternoon has no more tendency to cover the clear sky to the northwestward than it had in the morning, as shown in Fig. 4, Chart XII, then the wind will most generally become more northerly and the storm has passed, or will pass, in a northeastward direction through Iowa, Wisconsin, etc., far to the east of the station. If later in the first day the cirrus haze, shown in Figs. 4 and 5, has a tendency to cover the clear sky to the northward of

[1] Mapleplain is located approximately in W. 93° 40′, N. 45° 0′, or 30 miles west-northwest of St. Paul.—ED.

the station, as in Fig. 6, although it is itself moving from the southwest, and if the wind remains northeast, then heavy snow will occur during that night or the next day.

During the northeast storm the several forms of cirrus clouds usually move from southwest, the alto-stratus, cirro-cumulus, etc., with attendant pallium haze, from south-southwest or south, although the surface wind is from northeast. These conditions indicate heavy storm or precipitation. (See note at the end.)

Many times there will be no scud or rapidly-moving lower clouds until after the precipitation commences; then these will be seen, through breaks or let-ups of precipitation, to be moving rapidly with the surface wind from the northeast, or very nearly with the wind. While the low surface clouds (which frequently obscure the upper region when the northeast storm is prevailing) are moving with the wind toward the southwest, the whole area of rain, snow, or pallium haze itself, seems to be moving northeastward, as for example in the heavy storm of March 30, 31, and April 1, 1896. On March 31, with high northeast wind, and while the whole upper atmosphere was obscured by a low surface cloud moving from the northeast, a series of thunder showers occurred, moving from the south or southwest, and passing by on the north side of the station. This fact could easily be told by the smooth appearance due to rain, snow, and sleet in the south and southwest, as the whole storm moved northward, and finally disappeared in the north as the thunder moved off in that direction, although without any change in direction of the surface wind or lower cloud moving from northeast.

During the said thunderstorm the temperature was 10° to 13° below freezing.[1] Have noted similar movements of storms opposed to the wind in many cases.

(C) In the spring, when there is a storm in the distant southwest in the morning, with an east or southeast wind at this station, if the pallium haze below the cirrus and also some other upper high clouds move from east or northeast, there is then a heavy storm of rain or snow over Nebraska, South Dakota, southwest corner of Minnesota, and Iowa, but it will not cover Mapleplain but remain approximately stationary where it is. Of course, the upper atmosphere must not be so much obscured by surface scuds as to prevent observation of the upper clouds.

(D) Perhaps one of the most common storm conditions is the following (see Fig. 7):

Northwest wind changes to calm, or to between southwest to southeast by the next morning; during the night cirrus moved from northwest, west-northwest, or west. If pallium haze, cirro-stratus, and alto-stratus do not move with cirrus, they may be moving slightly more from the west or even southwest. If cloudiness increases, snow or rain is likely in afternoon or night; but if the cloudiness decreases it will be fair and warmer, and the rain, if any, may pass far to the northward. (See note at end.)

(E) In spring, summer, and fall I have noted that a storm of rain or snow in the Dakotas may be delayed for two or three days, if there is not much cloudiness, and during the first day or second morning the movement of the cirrus changes to one from a decidedly southerly direction while strong south to southeast winds are prevailing.

(F) As a rule the movements of cirrus and other clouds during the day differ from the movements from northwest or west, given by morning observation; the movement in the latter part of the day may be nearly southwest, or even wholly southwest, with southeast wind below. The delayed storms referred to in the preceding paragraph occur when in the latter part of the day the cirrus comes from south-southwest or south.

[1] How could it have been rain in the southwest; was it not snow?-ED.

(G) When a cloudy cirrus area passes along on the northwest or north side of us the cirrus clouds themselves moving from southwest, and a southeast wind has veered to southwest, and after remaining some little time in southwest has eventually become northwesterly and cooler, there is liable then to be a second storm condition or cloudy area approaching from the south or southwest of this station. The wind will then become northeast, and rain will occur here or pass by near here on our southeastern side, as happened on October 14, 1897, at this place (see Figs. 8, 9, 10, and note at the end).

Northwest wind veers to north or northeast during latter part of day or evening. Rain is apt to fall during the first night or second day.

(H) With cirrus moving from north or northeast rain never falls unless at the very close of a storm with high northerly gales when clearing weather may be expected (see Fig. 11). With this dry weather cirrus either scattering or obscuring sky the wind may blow from the west, southwest, south, or southeast.

(I) As a rule, if cirrus moves from northeast, fair with warm or hot weather may be expected; if it is cold there will be at least a decided rise in temperature the next twelve or twenty-four hours.

(J) If the wind be west, southwest, or south, as long as cirrus moves from northeast, fair warm weather may be expected, most usually lasting for one, two, or three days.

(K) If at the evening observation, on the first day, cirrus or cirro-stratus has changed and is moving from northwest and the wind remains south or southeast, the previous rule is broken and there may be rain or snow.

[NOTE.—Before publishing the above communication by Mr. Richards, it was referred back to him for further elucidation, and in his reply of April 5 he says:

"The condition exhibited in Fig. 1 may first appear somewhat later in the day, instead of in the morning, as in the following cases: February 13, 1898, it appeared in the latter part of the afternoon, and the northwest wind became east on the 14th, with 3 inches of snow on that date. It appeared again about 2 p. m. on the 15th, and the northwest wind became east and southeast on the 16th, with 1 inch of snow that day. It appeared again, March 30, 1897, at 1 p. m., and the northwest wind changed to southeast and northeast on the 31st, with 4.5 inches of snow, which began falling early in the morning of that date."

With regard to Fig. 4, he states that "on January 2, 1897, the clouds covered the south and southeast sky in the morning, but with northwest winds, which afterwards became northeast. This condition changed to Fig. 6 in the evening, followed by 8 inches of snow and a high northeast wind on January 3. On January 22, 1898, Fig. 4 was observed in the morning, and the northeast wind prevailed all day, but as the clouds had no further tendency to cover the sky to the northward of the station, therefore the storm passed away through Wisconsin; there was a covering of stratus moving from the northeast during a part of this day."

With regard to Fig. 7, relative to the approach of southeast storms, he says: "On October 8, 1897, the northwest wind changed to southeast by the morning of the 9th, and 0.23 of rain fell during the 9th and 10th; again, with the decrease of cloudiness, as on December 7, 1897, the conditions of Fig. 8 appeared in the early morning, followed by a southeast wind in the afternoon of that date, and fair weather continued during the night."

NORMAL ANNUAL SUNSHINE AND SNOWFALL.

By A. J. HENRY, Chief of Division.

The following table gives the annual percentage of sunshine and the total annual snowfall, by calendar years, for each of the regular Weather Bureau and Canadian stations. The amount of snowfall is given in inches as it lay upon the ground; the corresponding quantity of melted snow could not easily be deduced, as the rain and melted snow are not generally given separately. A close approximation to the melted snow will be obtained by taking one-tenth of the depth in inches, but the divisor should be smaller for the heavy snow of the warmer, rainy regions and larger for the light snow of the colder, dry regions.

The percentage of sunshine relates especially to the daytime, and is obtained by taking the difference between 100 and the percentages of cloudiness that are reported monthly from every station, and are based upon careful daily observations and estimates.

Charts VII and VIII give a graphic presentation of the facts contained in this table:

Mean annual sunshine and snowfall.

Stations.	Annual sunshine.		Annual snowfall.	
	Length of record.	Per cent.	Length of record.	Amount.
Alabama.	*Yrs.*		*Yrs.*	*Ins.*
Mobile	24	52	3	0.6
Montgomery	22	50	11	2.0
Arizona.				
Florence	6	78	.....	.....
Fort Apache	10	70	4	14.8
Fort Bowie	.....	.....	7	2.0
Fort Grant	12	70	7	7.0
Fort Thomas	6	72	7	3.0
Prescott	13	74	6	17.0
Tucson	9	74	3	2.0
Yuma	18	82	.....	.....
Arkansas.				
Fort Smith	12	56	11	11.0
Little Rock	15	53	11	6.0
California.				
Eureka	8	40	.....	.....
Fort Bidwell	.....	.....	4	56.0
Fresno	7	71	.....	.....
Keeler	8	76	9	3.0
Los Angeles	17	66	.....	.....
Redbluff	17	69	11	0.4
Sacramento	17	74	11	0.4
San Diego	23	58	.....	.....
San Francisco	23	58	11	0.3
Colorado.				
Colorado Springs	.....	.....	4	19.0
Denver	23	60	11	43.0
Las Animas	6	61	.....	.....
Montrose	8	60	8	25.0
Pikes Peak	17	59	.....	.....
Pueblo	8	57	.....	.....
Connecticut.				
New Haven	22	48	11	40.0
New London	24	50	11	34.0
Dist. of Columbia.				
Washington	24	49	11	27.0
Florida.				
Cedar Keys	10	57	.....	.....
Jacksonville	23	54	11	T.
Jupiter	7	53	.....	.....
Key West	24	55	.....	.....
Pensacola	15	55	11	0.5
Punta Rassa	11	53	.....	.....
Tampa	6	50	.....	.....
Titusville	7	58	.....	.....
Georgia.				
Atlanta	16	51	11	5.0
Augusta	24	54	11	2.0
Savannah	24	53	11	0.3
Idaho.				
Boise City	13	56	6	23.0
Lewiston	6	54	.....	.....
Idaho Falls	.....	.....	3	49.0
Illinois.				
Cairo	23	50	11	14.0
Chicago	24	49	11	36.0
Springfield	15	50	11	18.0
Indiana.				
Indianapolis	24	46	11	23.0
Indian Territory.				
Fort Reno	.....	.....	6	5.0
Fort Supply	.....	.....	5	12.0
Iowa.				
Davenport	24	49	11	29.0
Des Moines	16	51	11	36.0
Iowa—Cont'd.				
Dubuque	20	47	11	42.0
Keokuk	23	54	11	29.0
Sioux City	7	50	6	30.0
Kansas.				
Concordia	9	62	10	20.0
Dodge City	20	62	11	17.0
Leavenworth	22	52	9	25.0
Topeka	.....	.....	8	13.0
Wichita	6	59	7	15.0
Kentucky.				
Lexington	7	42	7	23.0
Louisville	23	48	11	15.0
Louisiana.				
New Orleans	24	53	.....	.....
Shreveport	23	54	11	2.0
Maine.				
Eastport	20	43	11	56.0
Portland	24	48	11	68.0
Maryland.				
Baltimore	24	48	11	26.0
Massachusetts.				
Boston	24	48	11	46.0
Nantucket	8	47	9	20.0
Springfield	8	46	.....	.....
Woods Hole	8	46	6	44.0
Michigan.				
Alpena	22	41	11	87.0
Detroit	24	45	11	43.0
Escanaba	17	44	6	71.0
Grand Haven	23	42	11	60.0
Lansing	.....	.....	4	37.0
Mackinaw City	.....	.....	4	87.0
Marquette	22	40	11	136.0
Port Huron	20	43	11	42.0
Sault Ste. Marie	7	27	.....	.....
Minnesota.				
Breckenridge	8	49	.....	.....
Duluth	24	47	11	62.0
Moorhead	14	50	11	37.0
St. Paul	24	49	11	37.0
St. Vincent	14	53	11	39.0
Mississippi.				
Meridian	6	50	3	0.5
University	.....	.....	6	2.0
Vicksburg	23	54	11	2.0
Montana.				
Fort Benton	7	52	.....	.....
Fort Custer	11	52	7	46.0
Fort Maginnis	7	50	5	71.0
Fort Shaw	6	57	.....	.....
Havre	13	51	11	37.0
Helena	15	52	11	50.0
Poplar River	7	60	5	29.0
Missouri.				
Columbia	8	48	3	16.0
Hannibal	.....	.....	3	17.0
Kansas City	8	53	7	20.0
Lamar	.....	.....	3	16.0
Springfield	9	53	8	16.0
St. Louis	24	53	11	18.0
Nebraska.				
Crete	.....	.....	6	24.0
North Platte	20	56	11	28.0
Omaha	24	52	11	24.0
Valentine	9	52	9	35.0

Mean annual sunshine and snowfall—Continued.

Stations.	Annual sunshine.		Annual snowfall.	
	Length of record.	Per cent.	Length of record.	Amount.
Nevada.	*Yrs.*		*Yrs.*	*Ins.*
Carson City	7	69	8	43.0
Winnemucca	16	62	10	35.0
New Hampshire.				
Manchester	.....	.....	6	72.0
Mount Washington	16	43	.....	.....
New Jersey.				
Atlantic City	21	50	10	16.0
Barnegat	12	49	.....	.....
Cape May	14	54	.....	.....
Sandy Hook	13	50	.....	.....
New Mexico.				
Fort Stanton	8	63	8	23.0
Santa Fe	21	63	11	29.0
New York.				
Albany	21	43	11	58.0
Buffalo	24	39	11	71.0
New York	24	48	11	41.0
Oswego	24	37	11	86.0
Rochester	24	40	11	79.0
North Carolina.				
Cape Hatteras	6	52	.....	.....
Charlotte	16	51	11	7.0
Fort Macon	6	52	.....	.....
Hatteras	14	54	11	1.0
Kittyhawk	14	53	11	3.0
Raleigh	8	48	11	6.0
Smithville	11	54	.....	.....
Wilmington	24	52	11	0.9
North Dakota.				
Bismarck	20	54	11	35.0
Fort Buford	16	48	10	37.0
Pembina	7	49	.....	.....
Fort Totten	.....	.....	4	34.0
Fort Yates	.....	.....	7	32.0
Ohio.				
Cincinnati	24	47	11	17.0
Cleveland	24	42	11	31.0
Columbus	16	45	11	27.0
Sandusky	17	41	11	31.0
Toledo	24	44	11	33.0
Oklahoma.				
Fort Sill	14	62	.....	.....
Oklahoma	5	64	3	10.0
Oregon.				
Ashland	.....	.....	4	11.0
Astoria	.....	.....	11	10.0
Baker City	5	50	6	56.0
Fort Klamath	.....	.....	3	101.0
Lakeview	.....	.....	4	37.0
Linkville	.....	.....	3	53.0
Portland	23	42	11	22.0
Roseburg	17	47	11	10.0
Pennsylvania.				
Erie	21	40	11	56.0
Harrisburg	7	45	.....	.....
Philadelphia	24	48	11	21.0
Pittsburg	23	42	11	32.0
Rhode Island.				
Block Island	14	50	11	18.0
Narragansett Pier	.....	.....	11	27.0
Newport	7	48	.....	.....
South Carolina.				
Charleston	24	54	11	0.1
Columbia	.....	.....	3	3.0
South Dakota.				
Deadwood	9	58	3	126.0
Fort Sully	.....	.....	6	20.0
Huron	13	54	11	25.0
Rapid City	7	50	7	33.0
Yankton	22	54	10	31.0
Tennessee.				
Chattanooga	16	49	11	9.0
Knoxville	24	51	11	12.0
Tennessee—Cont'd.				
Memphis	24	54	11	9.0
Nashville	24	47	11	11.0
Texas.				
Abilene	9	62	11	4.0
Amarillo	.....	.....	2	25.0
Brownsville	16	52	11	T.
Corpus Christi	8	44	8	0.7
Corsicana	7	55	.....	.....
Denison	8	58	.....	.....
El Paso	17	71	11	3.0
Fort Concho	8	61	.....	.....
Fort Davis	10	69	4	2.0
Fort Elliott	10	65	6	8.0
Fort Stockton	8	70	.....	.....
Galveston	23	55	11	2.0
Indianola	15	54	.....	.....
Palestine	13	52	11	3.0
Rio Grande City	14	56	.....	.....
San Antonio	16	52	11	0.6
Utah.				
Fort Duchesne	.....	.....	4	14.0
Salt Lake City	21	57	11	48.8
Vermont.				
Burlington	11	37	.....	.....
Northfield	8	38	8	89.4
Virginia.				
Cape Henry	13	52	11	6.2
Chincoteague	7	53	.....	.....
Lynchburg	24	52	11	21.9
Norfolk	24	51	11	9.3
Washington.				
Dayton	6	53	.....	.....
Fort Canby	11	36	6	9.9
Olympia	16	39	11	12.3
Port Angeles	9	41	11	24.6
Spokane Falls	14	45	11	42.7
Tatoosh Island	8	32	11	8.7
Walla Walla	9	51	9	25.7
West Virginia.				
Morgantown	10	44	.....	.....
Parkersburg	7	46	7	31.6
Wisconsin.				
Greenbay	8	37	9	75.5
La Crosse	22	50	11	38.4
Milwaukee	24	45	11	46.2
Wyoming.				
Cheyenne	24	59	11	41.9
Canada.				
Edmonton, Alb	.....	.....	11	36.0
Owen Sound, Ont	.....	.....	11	118.1
Swift Current, Assin	.....	.....	9	48.9
White River, Ont	.....	.....	6	81.1
Winnipeg, Man	.....	.....	11	52.7
Calgary, Alb	.....	.....	9	38.6
Medicine Hat, Assin	.....	.....	10	29.2
Port Arthur, Ont	.....	.....	11	48.0
Minnedosa, Man	.....	.....	11	41.9
Qu'Appelle, Assin	.....	.....	11	44.1
St. Andrews, N. B	.....	.....	11	98.8
Yarmouth, N. S	.....	.....	11	89.7
Grand Manan, N. B	.....	.....	11	66.4
S.U.P. Anticosti, Que	.....	.....	11	84.7
Halifax, N. S	.....	.....	11	81.0
Sydney, N. S	.....	.....	9	76.2
Father Point, Que	.....	.....	11	124.9
Chatham, N. B	.....	.....	11	119.3
Rockliffe, Ont	.....	.....	11	89.3
Quebec, Que	.....	.....	11	130.2
Port Stanley, Ont	.....	.....	11	66.2
Kingston, Ont	.....	.....	11	82.2
Parry Sound, Ont	.....	.....	11	130.5
Saugeen, Ont	.....	.....	11	127.4

THE MOON AND THE AURORA.

By Prof. H. A. HAZEN (dated April 14, 1898).

A belief in some sort of an influence of the moon on the earth and its atmosphere has been current from the earliest times. In the following paper I will discuss the evidence of such supposed influence on the aurora.

The United States Signal Service and its successor, the Weather Bureau, have always instructed the regular observers to carefully scan the sky at nighttime for auroras. In addition voluntary observers have made careful reports of all auroras seen by them. In the passage of years the number of these observers has largely increased, and we can not make an absolute comparison between the number of auroras in

1871 and in 1893, but by dividing this interval into six periods we will for each group determine the average relative frequency of auroras on each day of the tropical lunar month and, finally, the normal relative frequency for each day from the mean of the 300 tropical months that are studied. The original data are given in full in Table 1, but in Table 2 following it are given the total number of stations reporting auroras on each day of the tropical month for the whole period in each of the six groups. The first horizontal row in Table 2 gives the number reported during 1,120 days, or 40 months; the second to the fifth rows cover 1,400 days, or 50 months each; and the last row covers 1,680 days, or 60 months. In the next row, marked "total," are the observations for 8,400 days, or 300 tropical months. The row marked VII gives the mean for an average period of 50 lunations, or one-sixth of the previous row, and if we wish the average number of auroras for each day of the tropical month we must further divide each of these figures by 50. In obtaining the 28th figure for each month in Table 1 the record for the first day of the succeeding month has been used whenever it was necessary. Of course the variation in the influence, if there is any at all, would be practically unrecognizable from one day to the next.

These figures have been projected in curves, see Chart XIII. A simple examination of these curves shows how fervent an imagination would be needed to suggest the idea that there is a lunar force making its influence felt through each day of the month, and reaching a maximum on the 14th. Curves I, III, IV, and VI show no predominating influence at all, and in the final curve, marked VII, the maximum ordinate on the 15th day of the month is manifestly due to an enormous number of reports that enter into group II. To still further test this question the means given in row marked VIII were formed by omitting 13 of the lunar months, or 4 per cent of the whole. These months were those beginning as follows: January 1 and March 24, 1874; February 15, 1875; February 5, 1876; February 22, April 17, and May 15, 1877; August 1, 1880; January 27 and September 3, 1885; February 5 and September 11, 1887; and January 26, 1888. The last curve, VIII on Chart XIII, shows the result of this process of selection. It will be seen readily that the whole theory of a lunar influence upon auroras breaks down from first to last under this analysis.

Objection may be made that eliminating 4 per cent of the records is not justified in a study of this kind, but the following proposition is submitted as applicable in all cases where an attempt is made to determine a law or relation between dissimilar phenomena: *In studying relationships by coincidences between phenomena not known to be related, the elimination of at least 25 per cent of the whole series of periods ought not to make any marked difference in the supposed coincidences, or at any rate should not utterly blot them out.*

A little reflection will show that during those 13 months an enormous number of auroras occurred, due unquestionably to so-called magnetic storms which affect, very markedly, terrestrial magnetism, and are accompanied by outbursts on the sun and well nigh universal auroras. It can not, for a moment, be considered that these are caused by any influence of the moon.

If it were possible to determine the cause of the aurora an investigation as to its probable periodicity would be comparatively simple. We may say, however, that in all studies of this kind, where there is a groping in the dark for a periodicity, if any one of several groups shows a marked fluctuation at any point in the period a similar marked fluctuation should be noted in all the groups at that point, or else we must conclude that there is no effect from the cause we are studying. For example, in the diagram, curve II, if we ascribe the marked fluctuation on the 15th to the moon, then each of the other groups should show the same effect, and since they do not show any such effect we must say that the moon does not cause the effect in II. This conclusion is all the more certain in proportion as the supposed effect is the more marked.

In general, unless some causal relationship between phenomena can be shown *a priori*, no number of apparent coincidences between such phenomena can prove its existence. This is a most valuable criterion in all studies of this character.

In preparing this table the auroras in the United States published in the WEATHER REVIEW by civil dates on Washington, or seventy-fifth meridian standard time, were taken as a basis, and there were added the observations of Mr. Lueders at Sauk City, Minn.; at Toronto and Montreal, Can.; and at Willetts Point, N. Y., so far as available.

The date in the left-hand column is that when the moon's declination is farthest north, or the beginning of a lunar tropical month, and the figures in column 1 are the number of stations reporting auroras observed on that date. The figures for the 28th day in each horizontal row are the same as for the 1st day of the next row, except when the fraction of a day carries the end of the lunar month (27.3 days) over to the 28th day; it thus happens that of the figures in the 28th column two out of three are repeated in the first column of the next lower row. The mean date of the moon's farthest south is between the 13th and 14th, nearer to the 14th.

[NOTE.—The dates on which the moon's declination is the greatest north or south have been taken from the first portion of the American Nautical Almanac and refer to Greenwich mean time, astronomical reckoning; that is to say, the hours are counted from noon to noon, from 0 to 24. Thus, on December 9, 1870, the moon was farthest north (23° 5′ 50.5″) at twenty hours by Greenwich astronomical reckoning, which is the same as 8 a. m. of December 10, Greenwich civil reckoning. As the auroral records for North America have been kept in local dates that begin from five to seven hours later than Greenwich dates, it follows that generally, when an aurora occurs in the evening of any civil date on the American meridian, it is simultaneous with six hours later on the same astronomical date on the Greenwich meridian. That is to say, for instance, 9 p. m., December 9, 1870, by St. Paul civil reckoning, is simultaneous with fifteen hours, December 9, by Greenwich astronomical reckoning. The astronomical dates quoted in this table from the Nautical Almanac will, in the majority of cases, be the same as the civil dates on which the auroras were recorded. The exceptional cases are those in which the moon attains her farthest north after nineteen hours Greenwich time, astronomical reckoning, but these can not have any effect on the result.—C. A.]

TABLE 1.—*Reports of auroras and moon's declination.*

No.	Tropical lunar months. Beginning.	Tropical lunar days. Moon north. 1	2	3	4	5	6	7	8	Moon south. 9	10	11	12	13	14	15	16	17	18	19	20	21	Moon north. 22	23	24	25	26	27	28
1	1870, December 9							1		1				1	1		1												
2	1871, January 6								2						2	1	1										1		
3	February 2						1		1	3	3	5	4	1	1						3			6	1	1			
4	March 1										1							8	1			1			2		1	1	1
5	March 29			1	4								9		1		11	3		1	7			1		6		
6	April 25				2									1	8	2	6		3	1	1		1	1		2	1	3	7
7	May 22	7	2	1	1	3	1					1	1	1			5	4	1	1	13	2	1		2	1		9	6
8	June 18	6		2	4		4		4					1		3		2	1	1				1	2	1	14	2
9	July 16					5	10	7	5	1	1		1	4		1	1					7			4	3	4	7
10	August 12	7				4	8			1	1	1	4	6	2					1				1	1	3	10	5
	Sums	20	2	4	11	12	24	8	12	6	6	7	19	15	15	7	25	17	6	5	24	10	2	8	7	11	16	41	28
11	1871, September 8				1			1				1	2	1		1				1	1								
12	October 6					1						1		1						1								2	3
13	November 2			1					16	9	2	2	1	1		1			2									
14	November 29									3		3						4			1					1			
15	December 26												8		1				1	1									
16	1872, January 23								1	3				25	3				1			1			1		1	2
17	February 19								2	3	1	1	13					1								1		
18	March 17				1						1		3	1		1			8	1		1			1	20	3		
19	April 14	3	3		5	1					1			1	2						1		1		1		4		
20	May 11		1	1											6	2	2	3	4		1		1	2			1	1	
	Sums	3	4	2	7	2	0	1	19	18	5	8	27	30	12	5	2	8	16	4	4	2	2	2	3	22	8	4	5
21	1872, June 7			1	4	3	1	1		3							1						1					1	
22	July 4			1	4	15		2								1		1				1	1		8	2			
23	August 1		1	24	11	4		1	35	3	2			1	27				1		1	1			3	11	3		
24	August 28		10				1		7	2	2	4	2						2		1	3	1						
25	September 24					5	4	3	5	2	7	1	9	2		1	2			2	1	25	4	5	7	1			
26	October 22				1			11	10	3		4			1		4		1		11							1	
27	November 18						4	3	1	3	6	1	2	1	2	1	1							1					
28	December 15			1			1	1	1	5	1	3	2	3		2	2	5			2		4	1	15	1	2		
29	1873, January 12	1						8	1	2	1		1	1	3	2	1	5	1			13	6		1	1			
30	February 8									1			2	6	14	5	9	3	1	3			4	5	5			1	
	Sums	1	11	27	20	27	11	30	60	24	19	13	18	17	47	12	20	14	6	5	16	43	21	12	39	16	5	3	0
31	1873, March 7		3	5	4			1			2		2		1	8	12	8	2	3	3	1		4			7	1	3
32	April 3	3	1	1		1										2		8	7	9	7	1	3	2	7	4	4	3	7
33	May 1		1					1						1		15	6	3	1	2		21	3	7		1	1	1	12
34	May 28	12	5	2	2	17	4	1			1	2				1	3	3	6	6	6	1	15	1	6		2	5	7
35	June 24	7	4	27	11	3	5	2	1	3		1			1		4			8	1	5	2	8	1	3	1	25	6
36	July 22	4	3		1	2		1	2	6			1	2		3			1		1		8	2			4	9	2
37	August 18	2	1	2	1	4	8	6	6	10	5	2	4			1			1						2	1		9	3
38	September 14	3		1		2	4	2	3	3		3	3				3	7	1		1				1			2	1
39	October 11	1	2		1	3	1		4	2		3	3	2	1														
40	November 8				1		1	2	1				3		1	4	1		1	1	1					1			
	Sums	32	20	38	21	32	23	16	17	24	8	11	16	7	4	32	37	28	22	27	14	31	30	29	15	9	18	55	41
41	1873, December 5					1	2	2			9	3			1					1					1				
42	1874, January 1			1	1	2	1				2	7	4	1	2	20	28	79	3	3	1	1		1		2		2	
43	January 29	1							25	3	3		2	2			1	12		2	9	1		3	1		1	1	
44	February 25								1	3	55	11	3	3		3				1	3	1	2	2	4			1	
45	March 24				1				1	22	1	4	7	2	45	103	16	2			2	11	7	1	3	1			
46	April 20						2	2	1	5	1		1	1	6	15	3		1			1	1		2	2	8		2
47	May 18			2	1		1	3			2	1		1		1	1	6	3	3	3	9	26	3	1	1	2	3	4
48	June 14	4			2	1	1		2	2	1			1		2	1	1	1	1	6	3	2	1	1			10	9
49	July 12	15	10	12	2	3	2	2	1	3	1	3	1			2	1		1	2	1	4	2	2			1	1	3
50	August 8	3			7	9	3	14	1	1	5	3												1		1	2	3	2
	Sums	23	10	15	14	16	12	23	31	37	28	76	26	11	57	143	54	100	9	13	25	31	40	14	12	8	15	21	20
51	1874, September 4	2	4	1	14	8	3	11	19	43	1	1	1	1	1				1		1				1			1	1
52	October 1	1	10	155	71	19	25	6	2	3	3	2	21	19	8	22	5	1	2	2						1	1		
53	October 29			1	1	2	5	2	2	3	5	1	1	1	4	5	2	1	2					2	1	1	1		3
54	November 25		3	1	5	9	3		2	4	1		1	1	1	4	2	1			2	2						3	
55	December 22					1	2	1	1	1	1	3	2			3	2	2	1			1	1	1	1	1		1	1
56	1875, January 19	1			1	1	1	2		1			1	3					2	2	9	1	1	3				1	
57	February 15				1	1				1	7	5	125	10	23	6	39	5			2	7	3						
58	March 14							1		1				1	12	2	5	1	2	1			1	7	52	9	2	2	
59	April 10	2		1	2		1		1				1	1	6	1	1	20	4	1	1	1		2	4	8	2		3
60	May 8		6	3	8	1	1		1	2		1				26	2	1		2	1		2	3	4	1	3	4	4
	Sums	6	23	162	103	42	41	23	28	59	18	14	153	37	55	69	58	32	14	8	16	12	8	18	63	20	9	13	12
61	1875, June 4	4		8	1	3		1			1				2			2		1	1	3			1			2	2
62	July 2	1	3							5	2		3	1		1										3	1	2	2
63	July 29	2											1		1									1	1	1	1		
64	August 25		1		1					1	1	12	7	4	1	3	9		2	2	1			5		2		1	
65	September 21							1		1		6		2		1	4	5	6	2	1	1				1			
66	October 19	1	1				4			1			2			2	3	1		2	1	1	1	1			1			1
67	November 15	1			3		1	18		6				1	1		4	2	1	1					2		1		
68	December 12									2					1	4	2		1	2				2	2		1		1
69	1876, January 9	1			1	2	10	2		1		1	1	1	2				1		2						1		
70	February 5								1	1	1			18	16	145	2	1	1					1	1		1	2	
	Sums	10	5	8	6	5	15	22	12	8	22	10	12	23	31	168	10	13	11	5	5	4	9	6	5	7	6	6	5
71	1876, March 4									3	3	1										6	12	21	2	1	3	6	2
72	March 31	2							1					1		1		1	1	3	25	1		2	3	3	1		1
73	April 27	1							1							1	1				1	3	2	1				2	2
74	May 24	2	10							1		1	1			1			2	1	2	1					1		
75	June 21		1	2			1	4		3	1			1		1			1	1	1		1			1	20	2	8
76	July 18	8	4	2	1		1		2	1			8	1	2	1		1							2	5	4	1	1
77	August 15	2	1	1	1	1	1	2			1		14		2	1													1
78	September 11	1	1	16	6	1	1		1	1		1	38	3		21	21	5	1							1	2		1
79	October 8	1	1	10	3		1		1	1	3	1	1	1			1			1	1								
80	November 4						3	10		6	2		1																
	Sums	17	18	31	11	2	8	16	6	16	10	4	63	7	4	27	23	7	5	6	30	11	15	24	7	11	31	11	16

TABLE 1.—*Reports of auroras and moon's declination*—Continued.

No.	Tropical lunar months. Beginning.	Tropical lunar days. Moon north. 1	2	3	4	5	6	7	8	Moon south. 9	10	11	12	13	14	15	16	17	18	19	20	21	Moon north. 22	23	24	25	26	27	28
81	1876, December 2	....	....	1	....	....	2	....	....	9	4	....	1	1	....	1	3	....	1	....	1	1	1	....	....	....	....	....	....	....
82	December 29	....	....	....	1	....	....	....	1	13	8	1	....	....	....	....	2	6	3	....	....	....	1	1	....	....	....	....	....	....
83	1877, January 26	....	....	....	....	....	....	2	5	3	1	....	....	....	1	2	4	3	2	1	1	1	3	4	....	....	2	....	....
84	February 22	....	....	....	....	1	1	1	11	1	4	2	....	2	....	2	57	12	1	4	....	1	....	....	....	....	1	1	....	....
85	March 21	....	....	1	....	2	....	....	....	....	1	1	....	....	....	....	4	....	24	5	2	....	....	1	2	83	2	2	....
86	April 17	....	....	....	....	....	....	....	....	....	2	....	4	....	....	1	85	16	3	....	....	1	....	3	4	8	2	3	....
87	May 15	....	1	..	1	....	....	1	....	1	....	....	1	....	175	7	7	4	....	1	1	2	....	3	5	1	....	1	....
88	June 11	10	....	3	4	....	....	1	....	1	....	....	3	....	....	....	....	....	1	1	....	1	1	1	....	1	2	6	....
89	July 8	1	5	2	....	....	....	....	....	....	....	....	....	....	1	1	....	....	....	....	....	1	....	2	3	....	1	....	....
90	August 5	1	....	1	1	1	2	....	....	2	....	....	4	3	1	....	....	....	1	....	....	....	....	....	1	....	2	2	....
	Sums	12	6	8	7	4	5	5	17	30	20	4	13	6	178	14	162	41	36	12	5	8	6	15	15	94	12	14	....
91	1877, September 1	2	....	....	....	....	....	....	....	....	....	....	....	....	1	5	1	3	13	1	1	....	....	....	....	....	....	....	....
92	September 28	....	....	1	1	1	....	1	....	....	....	....	....	....	24	4	....	....	1	1	....	2	....	....	....	....	....	....	....
93	October 26	1	2	....	....	....	1	3	39	5	1	....	1	4	....	11	1	....	....	....	....	....	....	....	1	1	2	....	....
94	November 22	....	....	....	....	....	....	....	1	1	....	2	2	1	2	1	2	1	1	....	1	1	....	....	....	....	....	....	....
95	December 19	....	....	....	....	....	....	....	....	....	2	....	....	....	1	....	2	....	....	....	1	....	....	....	....	....	....	1	....
96	1878, January 16	..	2	....	....	....	....	1	63	4	1	....	....	....	....	3	....	....	....	1	....	4	....	....	....	....	....	....	1
97	February 12	1	....	....	....	....	....	....	1	....	....	....	....	....	....	2	1	....	1	....	2	....	1	1	....	2	....	....	....
98	March 11	....	1	....	....	....	....	1	....	....	1	1	1	2	....	....	1	2	2	1	....	....	....	2	1	....	1	....	....
99	April 8	1	....	....	....	....	....	....	....	....	....	1	3	....	....	....	....	1	....	2	1	1	2	1	....	....	....	....	....
100	May 5	....	....	1	....	....	....	1	....	....	....	....	....	....	2	....	....	....	1	....	2	....	1	....	....	....	1	....	....
	Sums	5	5	2	1	1	1	7	104	10	5	4	7	7	30	26	8	7	19	6	8	8	4	4	2	3	4	1	1
101	1878, June 1	....	....	7	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	1
102	June 28	....	1	1	1	....	....	....	....	....	....	1	....	....	....	....	....	....	1	....	....	....	....	....	....	1	....	....	....	1
103	July 26	....	....	....	....	....	1	2	2	1	....	....	1	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
104	August 22	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....	1	....	....	1	....	....
105	September 18	....	1	....	1	4	2	....	1	3	2	1	5	2	....	....	....	....	....	....	....	....	....	....	....	1	1	....	....	....
106	October 16	2	....	....	3	1	2	2	....	....	1	....	....	2	....	....	1	....	....	..	2	....	....	1	1	....	....	....	....	....
107	November 12	....	....	7	....	....	....	1	....	1	2	....	....	....	....	1	....	....	1	10	3	....	1	..	....	....	....	....	....	....
108	December 9	....	....	1	1	2	....	....	7	....	....	2	....	....	....	3	3	1	2	1	1	....	....	....	....	1	....	1	....	....
109	1879, January 5	....	....	....	....	....	....	....	....	1	....	....	....	1	....	1	....	1	....	2	2	....	....	....	1	....	....	....	....	1
110	February 2	1	..	....	....	1	....	....	....	....	1	1	2	1	....	....	....	....	....	..	....	1	....	....	....	....	....	2	....	....
	Sums	3	3	16	8	8	5	5	10	6	6	5	8	6	1	5	6	2	4	13	8	1	2	2	4	1	3	2	3
111	1879, March 1	....	....	....	....	....	....	....	....	....	1	1	1	1	1	1	....	..	....	3	1	1	..	1	....	....	1	....	1
112	March 29	..	....	1	....	1	....	....	....	....	1	2	1	....	....	....	....	2	....	....	1	....	56	7	1	1	....	1	....
113	April 25	1	....	....	....	....	....	....	....	....	....	....	1	1	....	....	....	1	1	1	....	....	....	1	....	..	..	2	1
114	May 22	....	9	1	2	....	....	....	....	....	....	....	....	....	....	....	....	3	4	3	1	..	2	1	....	1	2	40	5
115	June 18	5	3	....	1	....	1	2	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	2	....	....	1	1
116	July 16	....	3	2	2	....	....	....	1	16	....	....	....	1	....	....	1	1	....	....	....	....	2	3	1	6	....	....	. .
117	August 12	....	....	....	....	....	....	....	....	....	....	1	5	....	1	....	....	....	....	....	....	1	....	....	....	1	....	....	....
118	September 8	....	7	25	10	3	1	....	2	....	2	1	2	3	3	2	....	2	3	....	....	....	....	....	....	1	. .	....	....
119	October 6	2	17	1	1	2	1	....	....	....	....	....	1	1	2	....	....	1	....	1	1	1	1	1	1	....	1	2	2
120	November 2	2	....	....	1	1	....	....	....	1	1	2	2	1	1	....	....	....	1	....	1	....	....	....	....	1	....	1	....
	Sums	10	39	30	17	7	3	2	3	17	5	7	13	8	8	3	1	10	9	8	5	3	61	16	4	10	4	47	10
121	1879, November 29	....	1	....	....	....	....	2	....	7	6	1	2	1	3	....	....	....	....	3	2	....	....	1	1	....	....	....	....
122	December 26	....	....	....	....	....	....	....	....	..	2	....	....	2	1	....	....	2	....	....	....	....	1	....	....	....	1	....	....
123	1880, January 23	....	1	....	....	....	2	....	1	....	1	....	....	....	....	2	1	1	....	1	....	....	....	....	....	....	....	....	....
124	February 19	1	1	....	....	....	....	....	1	1	....	4	1	....	1	....	....	1	....	1	2	2	....	4	10	....	1	2	29
125	March 17	29	....	....	....	2	....	....	....	....	....	....	....	....	1	....	14	3	....	1	....	....	....	....	....	....	....	....	....	....
126	April 14	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	....	....	16	5	1	1	....	....	1	....	....	....	....	....
127	May 11	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	4	2	1	....	....	....	....	....	1	....	1	....	....	....
128	June 7	....	....	....	1	2	5	....	2	6	4	....	1	....	....	....	....	....	....	....	1	1	....	....	....	1	. .	....	....
129	July 4	....	1	1	....	....	....	....	1	1	20	1	1	1	1	2	1	....	....	....	....	....	....	1	....	1	1	....	1
130	August 1	5	2	2	5	13	6	5	2	1	3	....	50	50	3	1	1	....	....	..	....	1	....	1	1	....	1	....	5
	Sums	35	6	3	8	17	13	7	7	16	36	6	55	54	10	7	21	9	17	11	6	4	2	6	14	3	4	3	35
131	1880, August 28	2	2	....	11	7	1	....	1	1	1	....	1	....	....	1	....	....	6	....	....	....	....	....	1	3	....	....	....	1
132	September 24	1	1	2	20	20	20	20	5	....	....	....	....	2	16	1	2	....	....	1	....	1	....	....	....	....	....	....	....	....
133	October 22	1	4	1	12	....	2	6	1	4	12	8	12	10	3	....	3	....	3	3	4	3	....	....	....	....	1	....	....
134	November 18	....	....	2	3	1	2	..	1	1	2	1	2	7	9	1	2	....	1	....	4	....	....	....	....	1	....	....	....
135	December 15	....	....	....	....	....	....	1	....	....	....	....	1	1	2	1	1	....	....	1	....	....	....	....	....	....	....	....	....
136	1881, January 11	....	....	....	....	....	....	....	....	....	....	1	1	4	4	3	4	4	..	1	1	30	8	7	2	....	2	1	2
137	February 8	....	....	....	....	....	....	....	1	....	....	3	6	....	2	1	....	1	6	6	1	....	6	5	....	....	....	....	....
138	March 7	....	1	1	....	1	....	....	....	....	....	....	10	....	5	....	....	1	1	....	1	....	....	2	4	3	....	....	2
139	April 3	2	1	....	....	....	....	....	....	....	....	....	....	1	....	....	6	9	8	30	4	....	....	....	5	....	....	40	17	....	3
140	May 1	....	....	....	1	....	....	....	....	1	....	....	1	....	....	9	2	....	1	....	..	....	....	....	....	2	....	....	....	1
	Sums	6	9	6	47	29	25	27	8	8	15	10	31	31	39	24	24	13	43	16	15	36	16	14	14	45	23	1	9
141	1881, May 28	1	....	....	....	....	....	....	2	4	3	1	....	1	....	....	1	1	....	..	1	2	....	....	1	1	....	....	....
142	June 24	....	1	....	....	....	1	1	1	29	7	....	1	1	....	....	....	....	....	2	1	....	....	....	1	....	....	....	1
143	July 21	1	1	1	2	2	1	1	....	16	....	2	....	....	....	....	1	....	1	1	....	....	....	1	1	....	....	....	....
144	August 18	1	2	6	....	....	1	5	1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	2	77	50	29
145	September 14	29	4	3	1	1	....	8	1	....	9	1	3	1	....	6	1	2	....	....	1	....	....	....	1	1	1	....	....
146	October 11	...	1	....	....	....	19	....	4	6	7	2	1	....	....	....	2	5	....	1	....	1	....	1	....	....	....	....	....	....
147	November 8	....	8	2	....	1	1	1	....	2	3	....	1	2	....	2	20	....	....	3	2	....	....	....	....	....	....	1	1
148	December 5	1	....	1	16	3	10	3	2	....	2	....	....	1	1	....	2	....	3	43	18	4	....	....	....	....	....	..	1
149	1882, January 1	1	....	....	....	....	..	....	....	....	1	15	1	1	13	4	....	....	....	70	....	1	1	2	2	....	....	....	....
150	January 29	....	1	....	....	....	....	....	....	5	1	27	6	2	1	2	1	....	....	....	32	3	2	1	....	1	1	....	....
	Sums	34	18	13	19	7	33	19	11	63	33	48	13	9	15	14	28	8	4	120	55	11	3	5	7	5	79	51	32
151	1882, February 25	....	....	1	....	....	....	2	....	....	....	13	....	3	....	....	....	3	3	....	....	3	23	3	....	....	....	....	....
152	March 24	....	....	....	....	....	....	1	....	....	....	....	2	....	....	....	....	....	....	....	....	2	....	1	9	....	....	6	....
153	April 21	....	....	1	2	....	....	....	2	2	....	....	....	....	....	1	....	....	....	2	3	4	....	2	3	....	....	6	....
154	May 18	....	2	1	3	....	1	....	1	3	....	....	....	....	....	....	....	....	1	....	2	2	....	....	....	....	5	2	6
155	June 14	6	14	2	1	1	2	5	4	4	3	3	3	....	....	....	....	....	....	1	1	1	1	2	2	1	1	1	3
156	July 12	4	1	1	1	39	2	2	4	4	1	....	1	....	....	1	....	....	....	1	2	....	....	....	....	20	3	8	2	....
157	August 8	....	14	21	17	6	7	5	....	8	5	3	3	....	14	....	....	....	....	....	....	....	....	....	....	....	....	1	2	11
158	September 4	11	13	2	1	3	1	....	19	4	....	....	....	....	1	1	1	4	....	....	....	1	....	3	....	....	....	1	....
159	October 1	....	24	1	11	28	1	....	1	....	1	1	1	....	1	1	1	....	....	....	....	....	1	1	....	....	....	....	....
160	October 29	....	....	....	....	3	....	....	3	....	....	....	....	3	....	....	....	3	....	2	16	10	14	4	....	....	....	....	....	....
	Sums	21	68	30	36	80	14	15	34	25	10	20	8	8	16	4	2	10	4	6	24	23	39	16	34	4	15	20	20

TABLE 1.—*Reports of auroras and moon's declination*—Continued.

No.	Beginning.	Tropical lunar months.	Tropical lunar days																											
			Moon north.								Moon south.												Moon north.							
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
161	1882, November 25									3		1		1				1	3	1		1	26	5	2	2	3	9	1	
162	December 23		1				2				1					2	1	3		1	1					1				
163	1883, January 19			1			1		1	4						4	1	1	4	4	1		4					2		
164	February 15							1				20	10		15	10	15	10	10	5		5	10	10	6			6	10	
165	March 14			3		1	2	1		2				3	3	3	3	1	3	2	2	1	5	7	3	2	3		1	2
166	April 11						1		1	3	3					15	8	5	3	1	2	2	6	1	1	2	2	1		1
167	May 8		1	1				3			1			1	7	1				2	2	1					5	4	1	1
168	June 5			1	2	2			1	1	1	1	2						1					1	4		1	21	10	2
169	July 2		2	2	1	1	1	4	3	13	4						1		1					1	2		1			32
170	July 29		30	20	4				6		9	1																		
	Sums		34	28	7	4	7	9	12	26	19	23	12	5	25	35	29	21	25	16	8	10	51	25	18	7	15	41	25	38
171	1883, August 26									8	1	2	10		1	1	1	1			1		7	6		3			1	1
172	September 22		1	1	4	11	4					1			1	12	3	1								2	4		1	1
173	October 19		1					1		1						12	13	6		1	2							1		
174	November 16				1	2		3	7					1		1	1	24	1			1					1			
175	December 13								1					1			1	2				6	1							
176	1884, January 10						1					2			4	3		1				15			31	8				1
177	February 6		1									1				8	13	12	3		1			1	39	1				
178	March 4																													
179	April 1						1						2			6		1	11	3	3	2	1	1	1	18	1	6	1	1
180	April 28		1			4						1	3							1						3			
	Sums		4	1	5	17	6	4	8	9	1	7	15	2	6	43	32	48	15	5	7	24	9	8	71	32	9	7	3	4
181	1884, May 25					1					4		1							1		2		3	2	1	7	2	1	1
182	June 22		3	1	1		2				1		2	1						1		1		14	2	3				15
183	July 19		15	4	1		1	4	20	2	1	1				1												2		
184	August 16		1				3	2		2											1						1		4
185	September 12		4	19	7	3		32	10			1						1				14	5		1		4	1		4
186	October 9		4			1	1	1	4			1	1	1				2		2	1	1				1	14			
187	November 5					1	4	1	1		1	1			4	1		1		1	1	2			1	2		1			
188	December 3							2		1				2	2	1			2	7		3						1		1
189	December 30		1				1	1			24	1					2	1		5										
190	1885, January 27						1			1		22		1			1	39	6				3	3				2	1	1
	Sums		28	24	9	6	13	43	35	6	31	27	4	5	6	3	4	43	8	17	3	23	8	20	6	7	27	7	4	26
191	1885, February 23		1			1							2	6	1						2	7	68	7	2	2	1	12	4	
192	March 22						1					1			1			1	18	2	1	1		2	3	4	1			
193	April 19			1	1	1					1							1		2	1	2	5		18	1	20			
194	May 16		1		1							2	2	6				1	4	1	3	2	1	1		4			1	
195	June 12			2		1	1		1	1			2	2	14	5	1	1			1			1			2			
196	July 10				2	1		1	1	1	1			1	1		1			1				1	1	5	4		1	
197	August 6		8	5	1	1		1	2	1	1	1	1		1									1	1	1	3		1	1
198	September 3		9	16	2									10	46		3	2									1		1	
199	September 30								1		16	2		13	2	2	4	8	4	1	2			1						1
200	October 27		1	3	1	5	5						1	11		19	5	5	3		1			1						
	Sums		20	27	8	10	7	2	5	3	21	6	8	49	66	26	14	19	29	7	11	12	77	14	29	21	24	14	7	11
201	1885, November 23										14	2		1	1	28	18	6	1								1			
202	December 21							1			1	1		5	2	1	1			2	5	8	4	3	1		3			
203	1886, January 18				1		1	1			1		6	8	2			2	5		1	6	7	7	1	8	1	1	1	
204	February 14				1	1					6		2				1			1	1	1	3	1		1	2	1	3	
205	March 13				1	1	1	1	1		2	3		1		18	5	15	1	13	6	11	2	1	3		1		1	
206	April 10			3	3		13					2	16				3	3				2	8	4	1	1			1
207	May 7		1	37	18	1	1	1	3	1			4			4	3	1	1	1	1	1		2	2	2		2	1	2
208	June 3		2	23	19	1			1		1									1	3		1	3	1	2	2	1	47	21
209	July 1		1	8	2	1	1		1	1				2				1			1	1		9	1		2	3	96	9
210	July 28		9					1		2	1		2				3	2	3	2		1	3			3	1	1	64	3
	Sums		13	71	45	5	17	5	6	4	26	8	30	17	5	51	34	30	12	22	15	31	28	30	10	17	13	10	213	36
211	1886, August 24		3	1	3	1												1	2	6	1		1	1	1		2		1	12
212	September 21		2	1	1				1		6	11	8	2		2	4	6	11	12	2	1		2				1	1	7
213	October 18		7			3	2		1	1	4	10	24	4	3	1		12	8	7	2	2	1							1
214	November 14		1	1			1		3	1	2	7	1	2		1		4	4	3	2		1			1				
215	December 12		1			1		2			1		4	1		3	2		4	3		1							1	
216	1887, January 8								2		3	1	3		1		5	1	2	2	1			1				1		1
217	February 5							1	7	33	23	9	2	5	1	1	42	6	4	1	3	1	4	1		1	1			
218	March 4						2					2		3				5	5	2		5	4							
219	March 31			2									1									4				5	8	1		
220	April 28		2				4	2	1							1	6	1	1			3	7	2	1	1	2	19	16	5
	Sums		16	5	4	5	9	5	15	35	39	40	43	17	5	9	59	36	41	36	11	17	18	7	2	8	5	22	19	26
221	1887, May 25		5	1					1	1		2		2				3	3	1			1	1	1	1	2	1	2	1
222	June 21		1	1				3	1	1							1	5	1				1			1	3		2	13
223	July 19		15	4												1							1		1		5	12	4
224	August 15		4	2				1			2					4	3		2	1				3						1
225	September 11		1	1	1	2	11	5	3	1			5	3	2	3	40	2	13	1				1			1			2
226	October 9			3		3	6				1			1	2	7		1												
227	November 5					9	4			1	1	1	2		2	1	5	2	2	1										
228	December 2						4	1	1				8	7	2	1	8	5	1		1	12	1							1
229	December 30									1	9	10	1	2		3	9	4	2	4	3						1	2	1	
230	1888, January 26			1	1				1		4	5	2			40	1	2	1			1	1				5	4	2	
	Sums		26	13	2	14	25	10	7	5	17	18	18	15	8	60	67	24	25	8	4	13	3	4	4	8	11	10	17	22
231	1888, February 22				2						1					12	2	1	1		1			18	4	6	4			
232	March 21		2		1	1					5		2	76	17	5	8	1	1			5	57	8	11	3	5			
233	April 17														2	4	5	1	1	1	6	28	6	6	1		1			
234	May 14			1			2		55	6	2				1	2	3	1	1	2	4	20	2	2						1
235	June 11		2		1	2															5	3					1		
236	July 8										1	1				1						3	2				3	15		
237	August 4			1					5	1	1	1	1	4	3	1											1		2
238	September 1		2	1				1	1	2		2	3	3	4	1		1						1		2			2
239	September 28		2	1			2	2						5	10				1	1		2		2					1
240	October 25		1	1			1	40	7	1			1	4	3	1			1		1	1		1	1					
	Sums		9	5	4	3	5	40	63	13	6	8	4	10	91	38	26	18	6	5	5	17	59	69	36	20	9	15	17	6

TABLE 1.—*Reports of auroras and moon's declination*—Continued.

No.	Beginning.	Tropical lunar days. Moon north. 1	2	3	4	5	6	7	8	Moon south. 9	10	11	12	13	14	15	16	17	18	19	20	21	Moon north. 22	23	24	25	26	27	28
241	1888, November 21					3	2	1			2	1		2	2	2		1	2										
242	December 19					4	2	2	1			2	1		1						1									
243	1889, January 15						1												1	1	2		1		1					
244	February 11					1		1		1			3				4	1	6	2	1	1		23	2					
245	March 11				1					2		1			1			3	6							1			24
246	April 7	24	4	4	1				2						2		1					12		1	2			2	
247	May 4		1					1			1					1			4		1		1	3	1	1		2	1
248	June 1														1	1					1								
249	June 28				2	1			2		1		1		3	1			2	1	1	3		5	2	1	1		1
250	July 25	1	1				3			1				1									2						
	Sums	25	6	4	4	9	8	5	5	4	4	4	5	3	10	5	5	5	21	4	7	16	4	32	8	3	1	4	26
251	1889, August 21								3						1	1	1			1		1							
252	September 18	2			2	3	1		2		1				1	2	1		5	1							2	1	
253	October 15				2	1	1	4		5			1		1	1			4	2			1	1		1			1
254	November 11	1			1		3	16	4	1	2	1			1	1	16	2	2	5	1			1	1				
255	December 9				1	1	2	3	1		1			3	2		2		7	5		1				1	1		
256	1890, January 5							1						11	6		2	5		1					1		1	2	1
257	February 1	1					1					5		1	5	1			1		1								
258	February 28				2				1					1			5	1	4	1	2			1					
259	March 28											1	2			1			3	1	2	2					1		1
260	April 24	1		1	1										1				2								2	
	Sums	5	0	1	9	5	8	24	11	6	4	7	3	16	18	7	27	8	28	17	6	4	1	3	2	2	5	5	3
261	1890, May 21											1							1	2									
262	June 18		1															1	1	2	3		3		2	1		1	1
263	July 15	1	7	4	4															1	1							1	
264	August 11				8	3	3	1	5	4	2				1										3				
265	September 7		1		3	6	1		1	1	3		1	10	1	1							1		1	2			1
266	October 5	18			1	1	1			3	1		1	51	2		1	2					1	1		1	2	2	1
267	November 1	1	1	1			2	43						12	2	1	1			1	1								
268	November 28						1	1							1			1											
269	December 26				1	1													1				2		1	1			1
270	1891, January 22																	1	1	14		16	4	3	5	1			1
	Sums	20	10	5	17	11	8	45	6	8	6	1	2	73	7	2	3	4	4	20	4	17	11	5	12	6	2	4	4
271	1891, February 18	1		3											7	1	1	3					1	4	2	5	1	2	2
272	March 17	2	1								1		1	2	25	6	3		1			2	21	13	3	2	4	6	3
273	April 14		1			1				1	1		1	1	2	11						5			8	1			1
274	May 11	1		12	7	2	1								1			1	1	1						4	2		
275	June 8	1							1										1	1			2		1		1		1
276	July 5	1	1						1		1			1										1				1	
277	August 1		1	5	1					2	1		2	2						1		1	3			1	3	42
278	August 28	42	23	9	7	10	10	15	7	6		9	24	30	25	25	15	5				5	3	3			4	6	
279	September 24		4	6	10	20	15	6	2	2			1			10	10	4			1						3		
280	October 22		11	7	9		2	5	2		1						7	1								1		1	2
	Sums	48	42	42	34	33	28	26	13	11	5	9	29	36	60	53	36	14	3	3	1	13	30	21	15	12	14	21	51
281	1891, November 18	2	3			1			1			1	1	1			1			7	12		4		1	1			
282	December 16				1	1		2					2	1	5	2	1	3	2	4	4	13					2		3
283	1892, January 12	3			2								3		6		4	12	14	9									
284	February 8						35											9	8	11			13	1					12
285	March 6	12						4			1									7			1						
286	April 3																		1			12	6	26	12	2		6	5
287	April 30	5	1	1					2	1								1		15	1			1					
288	May 27						2	5	5				1			2	1	1	1			1	3			2		1	
289	June 24																				16	1		54				5	
290	July 21				1	3			1									1		1				5					1
	Sums	22	4	1	4	5	37	11	9	1	1	1	7	2	11	4	7	27	26	54	33	27	27	87	13	5	2	12	21
291	1892, August 17	1		1				2	1				1				1										3		
292	September 14			3											2	3				1									1
293	October 11	1	15	8		1		12	14			8													1	1	7		2	
294	November 7				1	2	1	2				2	5	1		1	1	1	1	2	2	1	2							36
295	December 5	2		1	1			2	19	5	2	1		2	1	3		4	11	11	4	2	5						1
296	1893, January 1	1				2	4		2	9	1		3	1	2			2	9	12	3	28	2	3					1
297	January 28	1			1				10	6										15	2								
298	February 25										1	5	1					3	26	11	4	1			2			4	4
299	March 24	4	6	1	3	2		2	2			1	1	1	2	2	1	1		19	5	4	5	2	2	1	3	7	2
300	April 20	2		2	1	1	2	6		3									12		3								
	Sums	12	21	16	7	8	7	26	48	23	4	17	11	5	7	9	3	11	59	71	23	36	14	6	5	8	3	16	45

TABLE 2.

No.	Beginning.	Lunations.	Lunar days. Moon north. 1	2	3	4	5	6	7	8	Moon south. 9	10	11	12	13	14	15	16	17	18	19	Moon north. 20	21	22	23	24	25	26	27	28
I	1870, December 9	40	56	37	71	59	73	58	55	108	72	38	39	80	69	78	56	84	67	50	41	58	86	55	51	64	58	47	103	74
II	1873, December 5	50	68	62	224	141	69	81	89	94	150	98	108	267	84	325	421	307	193	75	44	81	66	78	77	102	140	73	65	53
III	1877, September 1	50	59	62	57	81	62	47	48	132	57	67	32	114	106	88	65	60	41	92	54	42	52	85	42	38	62	38	54	58
IV	1881, May 28	50	121	139	64	82	113	103	89	86	139	100	99	33	54	112	83	142	66	46	144	136	102	95	116	87	60	149	103	120
V	1885, February 23	50	84	121	63	37	63	62	98	60	109	80	103	108	175	184	200	127	113	78	46	90	185	124	81	74	62	71	273	101
VI	1888, November 21	60	132	83	69	75	71	96	137	92	53	24	39	57	135	113	80	81	69	141	169	74	113	87	154	55	36	27	62	150
	Total	300	520	504	548	475	451	447	516	572	580	407	420	659	623	900	905	801	549	482	498	481	604	524	521	420	418	405	660	556
VII	Mean	50	87	84	91	79	75	75	86	95	97	68	70	110	104	150	151	133	91	80	83	80	101	87	87	70	70	67	110	93
	Selected total	287	505	483	541	464	422	433	499	522	526	351	393	449	491	588	433	505	406	472	487	473	573	507	512	400	395	396	651	548
VIII	Selected mean	48	84	80	90	77	70	72	83	87	88	58	66	75	82	98	72	84	68	79	81	79	96	85	85	67	66	66	108	91

NOTES BY THE EDITOR.

CHINOOKS VERSUS THE KURO SIRO.

Our esteemed voluntary observer, Mr. M. Messner, of Utica, Mont., mentions in a recent letter the fact that "the opinion is prevalent in this country that chinooks are caused by currents of air from the Japan current," and in order to controvert this error he desires to republish an article that lately appeared in the MONTHLY WEATHER REVIEW.

The error alluded to by Mr. Messner is an illustration of the ease with which our schools and newspapers disseminate and the public imbibe errors regarding atmospheric phenomena. The time has long since passed when everyone believed that the baser metals, such as lead, mercury, and silver, could be changed into gold. Chemistry has for a hundred years been taught so clearly and so widely that although some mistakes are still made, yet the grosser errors that belong to a crude stage of civilization have entirely disappeared. Those who believe in the transmutation of metals, or in perpetual motion, or in squaring the circle, are now recognized as men who refuse to be guided by the knowledge that is accessible in every school text-book. A treatise on meteorology that would begin by demolishing the thousand and one errors that we have inherited from our ancestors, or that have been invented by the modern demand for ingenious explanations, is perhaps the first step that is needed in the reformation of the popular conception of this branch of science.

It would require a learned antiquarian to collect all the popular meteorological errors that have been started from time to time and that are still afloat in some part of the world, like derelicts on the ocean. It is not so very long since Professor Loomis demonstrated the error of those who maintained that there is a specific equinoctial gale or storm that reappears every year. We are even now just emerging from the influence of a century of delusion relative to the idea that forests produce rain and that agricultural cultivation of the soil produces droughts. We have just, within twenty-five or thirty years, obtained a clear conception of the warm, dry, descending winds when, lo! a new error with regard to them appears. A century ago it was rational to inquire whether the Gulf Stream had any influence on our own or European weather, but now we know that if it has any, it is at least inappreciable in comparison with the general influence of the ocean. Similarly in the case of the Japanese current, or Kuro Siro, which is to the Pacific what the Gulf Stream is to the Atlantic, we have now from Montana a new query as to its action in forming chinook winds. A first glance at the map of the world must arouse in the mind of a rational person grave doubts as to whether the chinooks of Montana come from the Japan stream. This latter is fully 6,000 miles distant. The winds that blow over it form a part of the general circulation of the Pacific Ocean; eventually, they get into a whirl around the great depression in the North Pacific Ocean in the neighborhood of the Aleutian Islands. The rain and fog in this region and on the coast of Alaska, British Columbia, Washington, and Oregon are demonstrably due to the evaporation from the Pacific Ocean as a whole and to the fact that the winds are rising up over the Rocky Mountain Region. The Japan current, properly so-called, is due to this circulation of the winds; the winds are not due to it. Each square mile of the Pacific Ocean has a slight influence on this circulation, but the Japan current does not occupy one per cent of this area. The mere fact that the westerly winds are rainy and cloudy on the Pacific Coast but are warm and dry in Montana suffices to show that they have undergone a change in passing over the mountains and that the main features of these winds are due to something that takes place in the Rocky Mountain Region and not on the coast of Japan.

The map of the winds over the North Pacific in the winter months shows a powerful and prevailing cold, northerly current flowing from the interior of Asia over Japan south and southeastward, most of which then turns to the southwest over the Phillipine Islands into the Indian Ocean. What little passes over northern Japan and eastward to the middle of the Pacific Ocean then turns northward and returns in its circulation around the Aleutian area of low pressure. Not one part in ten thousand ever reaches Montana. On the other hand, the southwest wind of our Pacific Coast can easily be traced a little farther southwest and then southerly to the Hawaiian Islands, being a part of the circulation around an area of high pressure whose center lies a little southwest of San Francisco and northeast of Hawaii. These two systems of winds circulating about the highs and lows on the Pacific represent only what is going on at the very bottom of the atmosphere. If we go up 15,000 or 20,000 feet into the region of the upper cirrus clouds that float over all this part of the globe, we shall find them all moving from the west, or between northwest and southwest. It seems likely that a slow process of interchange takes place between this highest stratum and the lowest stratum. In this process the air within the areas of high pressure has a general descending tendency, that is to say, it is drawn from the upper level or that of the cirrus clouds, while the air within the areas of low pressure has an ascending tendency, and eventually reaches the level of the cirrus clouds. But these general tendencies upward and downward require considerable time, it may be days or weeks or months, according to circumstances, to complete an entire circulation for any given particle of air; in the course of this long period any given cubic foot of air may be dispersed in all directions, some of its particles going northward and some southward, some ascending and some descending until it is so dispersed that it would be impossible to trace the air that forms a chinook in Montana backward to any given region 500 miles away.

NOTES FROM THE REPORTS OF STATE SECTIONS.

A few of the reports from the State Sections, such as those from California, Washington, Oregon, North Dakota, and New York, are not published in full early enough to be quoted in these notes, which are, therefore, culled from the remaining States only.

COLORADO.

Mr. Brandenburg's special reports of snowfall enable him to state that—

> March has been similar to the winter months as regards deficient snowfall, and there has been no increase of consequence in the amount of snow stored in the mountains. None of the reports indicate anything near the average March snowfall, though in a few localities the fall has been somewhat greater than during the winter months.

IOWA.

Among the numerous interesting notes published by Dr. Chappel is a quotation relative to the earth's shadow as seen in the atmosphere, which suggests the following note by the present Editor. Shortly after sunset the eastern horizon is surmounted by a dark, purplish haze; above this is a more or less well-defined pink or reddish flat arch, stretching from northwest to southeast, or from north-northwest to south-southeast, and above that a whitish haze shading off into the blue sky above. As we survey the sky above and west of this

arch we find that the highest clouds that receive the sun's light appear white, while the lower clouds are of rich salmon and golden tints, and that every shade of intermediate color is found here and there between, down to the very lowest clouds, which receive no direct sunlight and are of ashy white or dark gray. If we recall that the color of the sun was dark red or bright salmon when last seen at sunset, we shall at once realize that if we could rise upward a little way until we again saw the sun in the horizon we should be where these brilliant-colored clouds now are and that the color of the illumination of the clouds must grow deeper and deeper as the sun sinks deeper in the west, or rather as the earth, revolving eastward, carries the clouds more and more deeply into its own shadow, until finally they receive no direct sunlight at all, but perhaps a little reflection from surrounding objects. The deep-red arch seen in the east is the boundary between the illuminated part of the atmosphere and the darker portion below; it rises higher every minute, and eventually passes over our zenith and sinks in the west or northwest. The so-called civil twilight ends and night begins when this arch passes westward over the zenith, but the astronomical twilight ends only when the arch disappears in the western horizon, so that the entire sky is free from diffuse sunlight. Owing to the influence of clouds or hills in the distant west and of possible haze at great heights, such as that of 1884–85, the end of the astronomical twilight may vary to a very great extent. In northern latitudes, such as St. Petersburg, on the 21st of June, when at midnight the sun is only a few degrees below the northern horizon, the twilight arch at that time stretches from east to west, reaching up half way to the zenith and is very sharply defined. Observations of this arch were formerly used as a basis for the calculation of the altitude of the upper limit of the atmosphere and gave results of from 40 to 50 miles, but it is now well understood that this can only refer to the height of such layers of dust or aqueous vapor as are capable of reflecting appreciable light to the eye. The most remarkable sunsets of modern times are those supposed to be due to the vapor thrown up by the eruption of Krakatoa. The aqueous particles that produced the red sunsets of 1884 were undoubtedly large as compared with those ordinarily present at great heights, and may have been correspondingly lower in the atmosphere.

In several of the reports of State sections and in the daily press we find quotations from the bulletin on Storms and Storm Tracks, by Prof. F. H. Bigelow. The reference to this should always be Weather Bureau Bulletin No. 20 and not No. 114, as the latter is simply the current number in the chronological list of publications of the Weather Bureau.

NEBRASKA.

Prof. C. E. Bessey, of the University of Nebraska, contributes the following interesting note on the so-called "false dew," known also as "guttation," or the exudation of water drops from leaves:

Observations and experiments made upon many plants in the physiological laboratory and the plant houses of the University of Nebraska show that under certain conditions water may exude in drops from the surface or margin of leaves. It is well known, of course, that water escapes from living leaves in the form of vapor whenever the air is not saturated with moisture. Thus, when a geranium plant is placed upon one of the pans of a pair of scales (after wrapping the pot with sheet rubber so as to prevent evaporation from the soil), it is found that in a little time the loss of water vapor from the leaves is great enough to be readily measured. If the plant be allowed to remain upon the scale pan for a day or two, the amount of water lost will be quite considerable in quantity and weight. This kind of water loss has been well-known for a long time, but there is another loss of water with which we have not been so familiar. To show this, experiments were made as follows:

1. In a box of sandy soil fifty or more kernels of wheat were planted and kept growing vigorously until the plants were two or three inches high. They were kept well watered, so that the roots were fully supplied with water. The air of the laboratory during the experiment was pretty dry, requiring the roots to be quite active in absorbing water to make good the loss of water by evaporation from the leaves. The box was then put over a warm radiator, and the soil slowly warmed to a temperature of 77° to 78° Fahrenheit. After an hour or so drops of water were observed upon the leaves, and these continued to increase in spite of the fact that the humidity of the air was shown by observation to be only 31 per cent.

2. Another box, containing vigorously-growing wheat plants, was treated as follows: Warm water was slowly poured upon the soil, so as to quite considerably raise the temperature. The box was then put under a bell jar and the temperature of the air suddenly lowered by sprinkling the bell jar with water, when water was seen to ooze from the leaves, usually near the tips. This was repeated again and again, always with the same result.

3. Similar trials were made with small plants of maize (indian corn) with similar results.

4. In the plant house small cabbage plants were observed to exude drops of water from the projecting points on their margins under similar conditions.

Here we have an exudation of water drops (known as "guttation") quite resembling the dew which so often wets the grass. At first we might suppose it to be nothing more than dew, but careful tests, which I need not describe here, show it to be an actual exudation. It appears that the roots in the warm, moist soil become very active in absorbing water to supply the water loss through leaf evaporation, and when the latter is suddenly checked by the cooling of the air and consequent increase in its humidity the root pressure forces out the water in the little drops just described. When unusually active, the roots may even force out drops in dry, warm air, as in one of the experiments described above. Exudation may thus take place when the soil is moist and warm, especially when, with these conditions, the air is quickly changed from a hot and dry to a cooler and more humid condition.

SULPHUR RAINS.

The Cincinnati Enquirer of March 22 reports that a "sulphur rain" fell at Mount Vernon, Ky., early on the morning of March 21, as also at several other places in Rockcastle County; the stuff burned and gave out fumes of sulphur.

Those who are not seeking after mysteries may rest assured that such a rain of sulphur simply brings down to the ground some pollen from the pine woods, or some other light substance that has only a short time before been carried up by a strong gust of wind. It saddens one to think that any superstition should attach to such an ordinary phenomenon, one that occurs every day of the year at some place on the globe. Still more is it a pity that our daily press should repeat, and apparently indorse, any of the popular errors regarding these and other meteorological phenomena. It is quite as easy for a popular journal to present the best thoughts of the best people as it is to merely diffuse and strengthen the errors of the ignorant. The past century has witnessed the banishment from our text-books of innumerable erroneous ideas that were accepted by our ancestors. Why can not the daily press assist in the work of educating the public and resolutely refuse to print such nonsense as "the people generally consider this a sure harbinger of war," or such headings as "a red sun: bloody omen," or again, "great drought: belief that the world is drying up and that its end is drawing near"? If any one thing is more clearly taught than another by all our teachers, both religious and secular, it is that the future is not and can not be revealed by signs and omens.

MOONSHINE AND FROST.

Among the many mysterious meteorological influences ascribed to the moon, the following is quoted from the Evansville (Ind.) Courier of April 4, 1898:

Within the past week there have been several frosts, but to all appearances vegetation is not injured in the least. The reason of the immunity is explained by James Wiltshire, one of the oldest inhabitants of that city, who states that he obtained the idea from Mr. Willard Carpenter more than fifty years ago. Mr. Wiltshire says: "Since then I have carefully observed this every year, and have yet to see the

first time that the frost hurt the fruit or plants in the light of the moon. By 'the light of the moon' I do not mean any time the moon is shining, but only the period when it is getting bigger each night. As soon as the moon is full it is then 'the dark of the moon,' and frost will injure the green things that it would not affect before. During the present lunation the light of the moon ends April 6 when the moon is full, if we have any cold weather after that you may look out for damage to fruit but none before that."

The Editor does not believe that there is any such lunar influence as above described, and appeals to the intelligent farmers who have kept full records of this subject to give him the actual data of observations whereby this subject may be tested. Every belief in lunar influence has thus far proved to be contrary to the facts, and he expects that this one will also be proved to be so.

RAIN IN THE HAWAIIAN ISLANDS.

Our correspondent, Mr. Curtis J. Lyons, in his report for March, printed elsewhere, states that—

The month has been an unusually rainy one throughout the group. Kaumana (near Hilo), Hawaii, reports 55.58 inches; 10.18 inches fell at Luakaha, Oahu (5 miles from Honolulu); on the 24th unprecedented floods did much damage, especially in Oahu and Kauai; heaviest rain on north side of Oahu on the 27th. Frequent thunder and lightning from the 12th to the 24th.

As before stated in the MONTHLY WEATHER REVIEW, the Editor's study of the general circulation of the atmosphere leads him to believe that the conditions that bring droughts or floods to the Indian Ocean, Asiatic coasts, and Australian regions move slowly eastward over the Pacific and are eventually felt in North America. We shall, with interest, look for a rainy season at some time following these floods in the Hawaiian Islands.

RECENT EARTHQUAKES.

The seismographs maintained by Professor Marvin at Washington, D. C., and Professor Morley, at Cleveland, Ohio, were not affected during the month.

The following reports have been received from the observers of the Weather Bureau, or culled from newspaper correspondents:

2d.—California, Visalia, 2:48 p. m.

3d.—California, Descanso, slight shock at 2:30 a. m.

17th.—California, Upperlake, at 11:40 p. m.; motion from east to west.

19th.—Montana, Marysville, 6:00 a. m., a rumbling noise followed by a severe shock lasting three seconds.

29th.—Kentucky, Mount Hermon, 7:30 p. m., very slight shock.

30th.—California, Oleta, 11:40 p. m., Peachland, 11:40 p. m., vibrations from southwest to northeast, severe. Riovista, 11:40 p. m. San Leandro, 11:40 p. m. Santa Clara, severe at 11:40 p. m. Santa Cruz, heavy, 11:40 p. m., duration from 30 to 40 seconds. Stockton, severe at 11:42 p. m. Vacaville, 11:45 p. m. Fort Ross, 11:45 p. m. Georgetown, between 11:30 p. m. and midnight. Hollister, about midnight, slight but of long duration. Iowa Hill, about 11:45 p. m. Lytton Springs, violent shock, no time given. North San Juan, at 11:42 p. m., vibrations southeast to northwest.

Sonoma: 11:45 p. m., one of the most violent and prolonged shocks ever felt here. The vibrations were from north to south accompanied by a rattle and a noise. The first shock was followed at intervals by four other tremblers that were very heavy and over twenty lesser ones.

Sacramento: 11:38 p. m., three shocks were felt here; they were of an easy undulating motion and seemed to be from southeast to northwest.

Ignacio: Tubbs Island, among the tules, sloughs, and salt water creeks, was surely the center of the great earthquake of the 30th; the island heaved, rocked, and trembled like a platter full of jelly, and everything on it was moved out of place.

Agnews: 11:30 p. m.; Campbell, 11:42 p. m.; duration forty seconds; vibrations from west to east; the motion was slow; it was considered as heavy, if not the heaviest, ever known here.

Centerville: 11:43 p. m., direction north to south; duration thirty seconds; 2 shocks. First shock rolling motion, second and severest seemingly an up and down motion; severest felt since October 21, 1868.

San Jose: One of the heaviest ever experienced occurred at 11:42:22. Lick Observatory reports the total duration forty seconds, and that after the first twelve and thirteen seconds the shocks were more violent than has ever been recorded there. The greater motion was southeast and northwest; the earth moved approximately one-quarter of an inch.

Santa Rosa: Most severe ever felt here; chimneys and plate glass windows destroyed.

Stockton: Severe quake at 11:40; vibrations for thirty seconds.

Los Angeles: No shock was felt here and all reports indicate that the quake was confined to a limited area close to San Francisco. The vibrations died away in Monterey County to the south and in Mendocino and Colusa counties to the north. The greatest energy was exhibited at Vallejo.

Oakland: Lasted several seconds. Tremor not so violent but the duration much longer than usual; at the Chabot Observatory the mean time clock stopped at $11^h\ 42^m\ 24^s$ p. m.

Bolinas: 11:43, seventeen seconds duration, vibrations from north to south; shocks short and sharp.

San Rafael: Severe shock shortly before midnight.

Suisun: Severe and prolonged shock at 11:45 p. m.; vibrations seemed north and south but the shake was very confusing as to direction.

San Francisco: Davidson Observatory, 37° 47′ 28″ N., 122° 25′ 41″ W., 54.5 miles north, 53.5 miles west from Lick Observatory. The first shock was at $11^h\ 42^m\ 16^s$, Pacific standard time, and lasted seventeen seconds. An ivory carving hanging in front of a mirror and almost touching it indicated by its gentle tapping that tremors continued passing until $11^h\ 44^m\ 48^s$, and then after a pause, again at $11^h\ 45^m\ 48^s$, and again later still. The mirror faces south and indicates north and south motions. The vibrations increased for the first six seconds; decreased somewhat to the twelfth second and died away, as far as could be perceived, at the seventeenth second.

San Francisco: The earthquake which occurred at 11:43 p. m., as shown by the hands of the clocks stopped in San Francisco, was the severest which has visited this region for many years. There was no preliminary tremor, but the rocking began without an instant's warning. The 19-story building of Claus Spreckels swayed somewhat, but sustained no injury. One house collapsed, while hundreds of chimneys fell and many panes of glass were broken, but on the whole the damage was slight. The water in the bay rose 2 feet and immediately subsided.

Mare Island: The navy yard on this island appears to have been the center of this earthquake. Many of the brick buildings and costly engineering plants belonging to the Government were injured, and the most conservative estimates place the damage to Federal property at more than $100,000, while about 1,300 men have been temporarily thrown out of employment.

Berkley: At the Students Observatory, University of California, severest experienced here since 1868. The large astronomical clock was stopped by the vibrations at exactly 11:42:26, Pacific standard time, but it is difficult to say how many seconds after the beginning of the disturbance this occurred. The best record of the direction and the intensity

of the vibrations was obtained from the duplex seismograph of Prof. A. Leuschner, and is analogous to the record obtained from the Chabot Observatory.

Prof. A. Leuschner, of the Department of Astronomy at the University at Berkeley, stated:

The duplex seismograph shows that the vertical vibrations were strongest and almost twice as strong as the horizontal vibrations from north to south and from east to west. The first displacement was north. It then turned west, and there were a series of short tremors, principally southwest. The displacement next turned southeast, and the maximum up and down vibration followed. Then came a series of small vibrations, at first southeast and later northwest. A northeast movement followed and was succeeded by one almost twice as strong in a direction exactly opposite. Here an almost circular vibration occurred, and then the vibrations gradually died out in a southwest direction.

METEOROLOGICAL TABLES AND CHARTS.

By A. J. HENRY, Chief of Division of Records and Meteorological Data.

For text descriptive of tables and charts see page 68 of REVIEW for February, 1898.

TABLE I.—*Climatological data for Weather Bureau Stations, March, 1898.*

Stations.	Elevation of instruments.			Pressure, in inches.			Temperature of the air, in degrees Fahrenheit.											Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches.			Wind.					Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Total snowfall.
	Barometer above sea level, feet.	Thermometers above ground.	Anemometer above ground.	Mean actual, 8 a. m. and 8 p. m. + 2.	Mean reduced.	Departure from normal.	Mean max. and min. + 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.						Total.	Departure from normal.	Days with .01, or more.	Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Maximum velocity. Direction.	Maximum velocity. Date.					
New England.							39.5	+ 6.6										30			2.64	— 1.3									5.4	
Eastport	76	69	74	30.10	30.19	+ .31	34.8	+ 6.1	53	20	40	18	24	30	23	31	28	79	2.65	— 1.8	12	7,345	sw.	40	sw.	23	11	9	11	5.6	12.6
Portland, Me.	103	81	89	30.08	30.19	+ .27	37.4	+ 5.4	62	23	44	21	4	31	30	33	29	78	1.21	— 2.1	9	5,130	s.	28	nw.	23	12	11	8	4.5	7.2
Northfield	872	15	65	29.24	30.21	+ .23	34.1	+ 9.1	58	20	45	— 4	1	23	40	30	25	78	0.64	— 1.8	8	7,327	s.	36	s.	23	12	11	8	5.1	0.3
Boston	125	115	181	30.09	30.23	+ .28	42.8	+ 8.6	66	13	50	35	2	36	16	38	35	84	1.82	— 2.3	11	7,345	sw.	39	w.	20	11	6	14	5.8	6.0
Nantucket	14	43	54	30.22	30.23	+ .23	40.6	+ 5.7	56	13	45	30	2	36	16	38	35	84	2.56	— 1.0	11	8,298	s.	46	n.	31	11	8	12	5.8	1.0
Woods Hole	22	51	57	.....	.....	.....	39.9	+ 4.8	55	11	45	28	1	35	20	....	....	....	3.12	— 1.6	9	9,033	se.	48	nw.	31	13	4	14	5.2	3.8
Vineyard Haven	.....	20	....	.....	.....	.....	43.0	+ 6.0	62	13	49	28	4	37	24	....	....	....	4.27	— 0.2	10	.....	sw.	....	.....	...	14	3	14	....	3.4
Block Island	27	39	48	30.21	30.24	+ .28	39.8	+ 5.0	56	20	44	27	1	36	14	38	36	86	3.89	— 0.1	11	9,466	se.	64	ne.	4	8	17	6	5.2	6.2
Narragansett Pier.	.....	10	....	.....	.....	.....	40.4	+ 7.1	61	20	48	23	1	33	23	....	....	....	3.75	— 0.8	14	.....	s.	....	.....	...	17	1	13	....	6.0
New Haven	107	118	140	30.12	30.24	+ .25	42.4	+ 7.8	64	17	50	23	1	35	25	38	34	78	2.54	— 1.7	14	6,036	n.	40	n.	20	10	9	12	5.7	6.0
Mid. Atlan. States.							45.8	+ 7.4										76	2.79	— 1.1									6.2	
Albany	97	84	113	30.12	30.24	+ .25	42.2	+10.3	64	11	51	18	1	33	26	37	32	73	1.08	— 1.6	8	6,736	s.	35	se.	13	15	5	11	5.0	2.0
Binghamton	875	79	90	.....	.....	.....	41.0	+10.2	68	19	50	15	4	32	29	....	....	....	2.31	.....	13	5,257	nw.	36	sw.	23	10	10	11	5.5	4.1
New York	314	308	326	29.88	30.23	+ .23	43.7	+ 6.8	69	19	50	24	1	37	25	39	35	78	2.92	— 1.1	17	8,222	nw.	33	n.	4	7	11	13	5.9	1.9
Harrisburg	377	94	104	29.81	30.23	+ .19	46.8	+10.6	76	19	54	26	1	39	29	41	35	70	3.04	— 0.4	14	5,739	e.	33	w.	17	6	7	18	6.8	1.6
Philadelphia	117	108	184	30.11	30.23	+ .21	48.0	+ 8.9	72	17	56	25	1	40	28	42	36	73	3.05	— 0.2	12	7,385	n.	31	nw.	31	6	7	18	6.8	2.3
Atlantic City	52	68	76	30.18	30.24	+ .24	44.0	+ 6.4	68	17	49	23	1	39	24	42	40	88	2.56	— 1.4	11	8,329	e.	41	ne.	4	7	12	12	6.1	
Cape May	24	52	70	30.21	30.23	.....	44.4	+ 4.9	64	20	49	26	1	40	21	42	....	....	3.00	.....	14	9,018	ne.	40	s.	13	8	9	14	5.6	
Baltimore	123	68	82	30.10	30.23	+ .20	48.6	+ 7.1	77	19	56	27	1	41	29	43	37	69	2.58	— 1.5	19	4,235	e.	24	nw.	31	7	10	14	6.4	2.4
Washington	112	59	76	30.11	30.23	+ .19	48.8	+ 7.5	78	19	57	25	1	40	30	43	39	74	2.52	— 1.6	15	5,280	s.	25	nw.	31	10	6	15	5.9	2.0
Cape Henry	.....	5	34	.....	.....	.....	50.4	+ 5.2	85	23	57	29	2	44	36	....	....	....	3.38	— 1.8	15	.....	ne.	....	.....	...	5	18	8	....	
Lynchburg	685	83	88	29.47	30.22	+ .17	50.8	+ 5.6	82	19	60	21	1	42	38	45	40	72	3.25	— 0.4	11	3,028	e.	22	nw.	31	10	8	13	5.8	0.3
Norfolk	57	88	93	30.16	30.23	+ .19	52.6	+ 5.7	84	23	60	31	1	45	31	48	46	86	3.51	— 1.1	12	5,938	ne.	28	sw.	13	6	5	20	7.0	
Richmond	144	98	105	.....	.....	.....	52.0	.....	.....	82	19	61	28	1	43	35	....	....	3.78	.....	15	5,595	n.	25	s.	13	8	9	14	6.6	T.
S. Atlantic States.							59.1	+ 5.4										81	2.22	— 1.6									5.4	
Charlotte	773	68	76	29.35	30.18	+ .13	55.1	+ 5.2	84	23	63	28	5	47	32	49	45	77	5.83	+ 1.1	14	6,231	ne.	33	sw.	24	9	9	13	6.6	T.
Hatteras	11	17	36	30.18	30.19	+ .15	55.8	+ 5.7	71	28	61	36	*	51	24	53	51	88	2.45	— 3.6	12	10,587	n.	39	n.	24	14	6	11	5.4	
Kittyhawk	9	12	30	.....	.....	.....	51.2	+ 3.8	84	23	59	31	1	44	38	....	....	....	3.08	— 2.1	10	10,888	.....	....	.....	...	12	5	14	5.5	
Raleigh	375	93	101	29.81	30.22	+ .17	55.2	+ 7.0	87	23	64	28	1	46	34	48	45	76	4.16	— 0.8	10	5,149	ne.	26	sw.	2	5	9	17	6.8	
Wilmington	78	82	90	30.12	30.20	+ .15	59.4	+ 5.5	84	19	67	33	1	51	27	53	51	84	1.52	— 2.4	8	6,930	ne.	37	ne.	4	7	14	10	5.3	
Charleston	48	14	92	30.16	30.21	+ .14	61.6	+ 4.9	81	21	68	39	1	55	30	55	52	79	1.71	— 2.2	6	8,652	sw.	45	ne.	3	9	17	5	4.8	
Columbia	.....	5	....	.....	.....	.....	60.0	+ 5.8	89	23	70	30	1	50	36	....	....	....	3.29	— 1.2	6	.....	ne.	....	.....	...	7	12	12	....	
Augusta	180	89	103	29.97	30.17	+ .11	61.8	+ 6.3	87	23	71	34	5	53	31	54	51	75	3.14	— 2.0	6	5,029	ne.	26	nw.	24	8	11	12	5.9	
Savannah	82	63	89	30.09	30.18	+ .08	64.0	+ 5.5	87	20	73	37	1	55	28	57	55	84	1.93	— 1.8	3	6,634	s.	51	ne.	3	17	7	7	4.5	
Jacksonville	43	69	84	30.12	30.17	+ .08	66.7	+ 4.7	87	22	75	42	5	58	29	60	58	84	2.04	— 1.4	3	6,121	s.	26	ne.	3	22	6	3	3.7	
Florida Peninsula.							70.7	+ 2.0										74	1.35	— 0.8									3.5	
Jupiter	28	13	30	30.12	30.15	+ .05	69.8	+ 2.0	79	24	75	47	1	65	20	64	60	72	3.25	+ 1.0	7	8,027	e.	34	s.	3	16	13	2	3.9	
Key West	22	43	50	30.11	30.13	+ .03	73.3	+ 0.6	82	24	77	60	1	69	14	66	63	72	0.70	— 0.5	4	8,199	e.	36	w.	3	17	12	2	3.9	
Tampa	36	60	67	30.11	30.15	+ .05	69.0	+ 3.5	86	26	79	46	2	59	30	61	58	78	0.08	— 2.9	3	4,780	ne.	23	sw.	4	18	12	1	2.6	
East Gulf States.							62.4	+ 3.9										80	2.66	— 3.2									5.6	
Atlanta	1,131	92	126	28.97	30.17	+ .07	57.5	+ 6.0	80	19	66	31	5	49	29	52	48	80	4.09	— 2.0	12	7,200	sw.	30	nw.	24	3	14	14	6.6	
Pensacola	56	78	90	30.08	30.14	+ .04	63.7	+ 4.2	78	22	70	38	5	58	32	60	58	86	3.01	— 2.4	4	6,937	s.	30	n.	3	9	13	9	5.5	
Mobile	57	88	96	30.08	30.14	+ .05	62.6	+ 3.7	82	24	70	35	5	55	29	58	57	87	1.90	— 5.7	7	7,357	s.	27	n.	3	4	18	9	6.1	
Montgomery	221	100	112	29.91	30.14	+ .05	62.0	+ 5.0	86	23	72	33	5	52	26	55	51	74	2.05	— 4.4	9	5,595	s.	24	sw.	28	15	11	5	4.5	
Vicksburg	247	65	78	29.82	30.08	.00	61.1	+ 3.1	84	18	70	34	4	53	31	56	54	85	3.99	— 2.5	9	6,599	se.	28	w.	12	10	14	7	5.3	
New Orleans	54	112	120	30.05	30.11	+ .04	65.0	+ 3.0	82	23	72	39	3	58	26	59	56	80	0.80	— 4.5	6	8,055	se.	35	se.	12	8	14	9	5.4	
Port Eads	.....	27	....	.....	.....	.....	64.8	+ 2.6	78	*	71	44	*	59	17	. ..	....	...	2.80	— 1.0	3	.....	se.	....	.....	...	4	16	11	....	
West Gulf States.							59.6	+ 1.8										78	3.71	+ 0.3									6.5	
Shreveport	249	77	84	29.79	30.06	.00	60.0	+ 2.4	87	18	69	34	4	51	30	53	49	72	2.24	— 2.4	11	7,196	se.	30	nw.	12	7	6	18	6.8	
Fort Smith	481	63	72	29.52	30.04	.00	53.0	+ 3.0	84	18	63	29	3	43	41	48	43	74	10.53	+ 7.3	15	5,428	e.	34	nw.	27	12	3	16	5.7	0.6
Little Rock	302	71	79	29.76	30.09	+ .01	55.5	+ 3.3	84	18	66	29	4	46	35	49	44	72	2.64	— 2.6	11	6,879	se.	29	w.	22	8	7	16	6.4	
Corpus Christi	20	42	50	29.99	30.01	— .04	64.2	+ 1.4	80	12	69	40	24	59	31	61	59	87	2.74	+ 1.1	11	11,435	se.	41	ne.	28	6	9	16	6.5	
Galveston	42	85	96	29.99	30.03	— .02	62.6	+ 0.1	75	22	67	42	3	58	25	60	59	90	4.10	+ 1.2	11	9,995	se.	36	ne.	2	4	13	14	6.5	
Palestine	510	54	61	29.50	30.05	— .02	59.2	+ 1.6	86	18	68	31	24	50	32	55	53	85	2.24	— 1.7	11	6,819	ne.	27	se.	12	4	10	17	7.2	
San Antonio	704	95	104	29.26	30.01	— .04	62.4	+ 0.5	90	22	71	33	4	53	37	55	49	69	1.47	— 0.6	5	8,856	se.	42	n.	2	6	10	15	6.5	
Ohio Val. & Tenn.							51.1	+ 7.1										74	6.31	+ 2.0									6.4	
Chattanooga	762	106	112	29.36	30.17	+ .09	56.6	+ 6.1	82	23	65	29	5	48	29	50	46	75	2.68	— 3.3	13	6,521	s.	28	s.	12	5	15	11	6.4	T.
Knoxville	1,004	10	88	29.09	30.16	+ .07	55.2	+ 7.6	79	23	64	30	5	46	30	49	47	79	3.97	— 1.4	10	6,686	sw.	40	s.	13	10	14	7	5.1	T.
Memphis	399	140	154	29.67	30.10	+ .03	56.8	+ 5.2	83	22	66	30	2	48	29	49	43	66	4.73	— 1.1	10	9,112	s.	44	w.	15	6	14	11	6.0	
Nashville	545	128	134	29.54	30.13	+ .07	54.8	+ 6.1	80	19	64	27	5	46	33	47	42	68	5.36	+ 0.2	11	6,915	s.	32	sw.	12	11	9	11	5.7	
Lexington	989	75	104	29.06	30.14	+ .09	49.0	+ 7.1	72	19	56	26	*	42	27	44	38	70	8.18	+ 3.5	16	8,904	s.	44	w.	13	2	8	21	8.1	1.1
Louisville	525	114	136	29.56	30.14	+ .07	51.2	+ 6.8	75	16	60	28	5	43	30	45	39	70	9.94	+ 5.9	17	6,756	n.	42	w.	13	7	4	20	7.5	1.2
Evansville	434	72	82	.....	.....	.....	50.4	.....	.....	74	22	58	26	3	43	28	..	....	8.73	.....	16	6,283	s.	35	s.	27	10	5	16	5.9	T.
Indianapolis	823	154	164	29.24	30.13	+ .09	46.4	+ 6.9	72	19	54	23	3	38	29	41	36	72	9.90	+ 6.3	17	8,105	s.	44	s.	27	7	8	16	6.4	0.9
Cincinnati	628	152	157	29.47	30.16	+ .10	49.2	+ 7.0	74	19	57	27	1	41	29	44	40	75	6.70	+ 3.4	19	5,735	s.	34	w.	13	9	7	15	6.1	5.4
Columbus	824	87	100	29.25	30.15	+ .11	46.3	+ 8.2	77	19	55	23	3	38	29	41	38	78	7.03	+ 4.0	17	5,854	se.	37	w.	19	9	7	15	6.1	3.8
Pittsburg	842	116	123	29.26	30.18	+ .14	47.8	+ 9.1	78	19	57	20	1	39	30	44	41	83	5.45	+ 2.7	13	4,960	n.	32	nw.	13	4	14	13	6.5	2.4
Parkersburg	638	77	84	29.49	30.19	+ .14	48.6	+ 8.1	81	19	58	20	1	39	34	43	39	75	5.43	+ 2.2	15	4,417	nw.	34	nw.	13	7	7	17	6.8	3.5
Lower Lake Region.							42.4	+10.0										76	3.20	+ 0.6									5.9	
Buffalo	768	178	206	29.31	30.16	+ .16	41.1	+11.1	63	19	49	16	5	33	30	36	31	70	1.97	— 0.6	14	10,780	sw.	60	sw.	13	7	12	12	6.3	2.0
Oswego	335	76	87	29.79	30.17	+ .17	41.4	+11.0	68	19	49	20	2	34	28	37	33	75	2.08	— 0.5	11	9,261	se.	37	w.	13	12	8	11	4.9	T.
Rochester	523	81	90	29.57	30.15	+ .15	42.7	+12.4	72	19	51	16	2	34	35	36	31	70	2.34	— 0.5	14	6,309	sw.	47	sw.	13	15	6	10	4.6	1.2
Erie	714	92	102	29.37	30.16	+ .15	42.8	+10.4	74	19	51	20	1	35	32	38	35	81	3.24	+ 0.5	10	9,065	s.	42	w.	13	10	13	6.2	0.7
Cleveland	762	190	201	29.31	30.14	+ .10	43.0	+ 9.5	74	19	51	15	1	35	31	38	34	78	4.06	+ 1.3	13	10,457	se.	61	w.	13	10	10	11	5.7	1.7
Sandusky	629	62	74	29.45	30.14	+ .10	44.0	+ 9.3	74	19	52	17	1	36	30	39	35	78	5.53	+ 3.0	13	6,232	sw.	40	w.	13	8	4	19	7.0	0.8
Toledo	674	122	127	29.39	30.14	+ .12	43.5	+ 8.9	71	19	52	18	3	35	31	37	33	74	3.23	+ 1.2	13	7,575	sw.	36	s.	27	9	6	16	6.2	1.2
Detroit	730	160	166	29.33	30.14	+ .12	40.3	+ 6.8	69	19	48	16	5	32	30	36	32	77	3.11	+ 0.8	13	7,141	w.	42	s.	28	9	5	17	6.4	2.5
Upper Lake Region.							34.8	+ 7.7										79	2.97	+ 0.9									5.7	
Alpena	609	61	65	29.41	30.10	+ .08	32.5	+ 8.5	58	16	39	9	5	26	30	30	26	79	2.51	+ 0.6	13	7,368	se.	36	nw.	13	10	10	11	5.8	0.9
Grand Haven	628	55	64	29.39	30.09	+ .07	37.6	+ 7.0	62	27	45	12	3	30	32	34	31	83	3.55	+ 1.3	12	7,742	se.	40	sw.	28	9	10	12	5.7	1.3
Marquette	734	67	95	29.19	30.01	— .08	32.1	+ 8.9	56	9	39	12	3	25	25	29	25	79	2.32	+ 0.5	12	8,769	sw.	44	s.	8	6	9	16	6.8	18.8
Port Huron	639	70	108	29.42	30.14	+ .12	38.3	+ 9.2	68	19	47	11	5	30	31	34	31	80	3.64	+ 1.0	14	8,418	s.	46	w.	13	13	8	10	4.9	0.1
Sault Ste. Marie	634	58	65	29.35	30.06	+ .02	29.0	+ 7.1	52	16	38	— 3	3	20	42	26	23	82	2.98	+ 1.8	12	7,153	se.	38	nw.	13	6	13	12	6.4	10.9
Chicago	824	241	274	29.20	30.11	+ .07	40.4	+ 6.3	68	16	48	21	5	33	30	34	33	77	4.60	+ 2.2	14	13,046	s.	62	w.	28	15	7	9	4.4	1.0
Milwaukee	671	106	149	29.35	30.10	+ .07	37.6	+ 7.1	62	16	45	17	3	30	30	33	29	77	3.45	+ 1.0	13	7,369	sw.	42	sw.	28	4	13	14	6.4	6.3
Greenbay	617	49	57	29.38	30.08	+ .04	35.2	+ 8.5	56	16	42	15	4	28	32	30	27	78	2.96	+ 0.9	11	6,750	s.	37	sw.	28	10	12	9	5.5	7.2
Duluth	702	95	106	29.20	30.00	— .05	30.6	+ 6.6	57	25	38	6	23	23	29	27	24	79	0.75	— 0.9	10	9,098	sw.	46	ne.	14	5	21	5	5.5	5.9
North Dakota.							21.9	— 0.2										75	1.19	+ 0.4									5.2	
Moorhead	935	54	60	28.97	30.04	— .06	26.6	+ 6.4	62	7	37	— 6	22	16	36	23	20	84	1.32	+ 0.4	8	9,336	nw.	52	se.	15	10	8	13	5.8	13.0
Bismarck	1,674	16	29	28.20	30.08	— .02	23.4	+ 0.8	66	7	34	—11	22	13	37	19	10	60	1.00	— 0.1	10	7,928	nw.	48	w.	15	14	5	12	5.1	6.0
Williston	1,875	15	31	27.98	30.10	+ .02	15.8	— 7.7	60	7	37	—17	28	4	39	15	11	82	1.25	+ 0.8	6	6,381	n.	32	n.	15	14	11	6	4.7	12.2
Upper Miss. Valley.							41.2	+ 5.4										73	4.87	+ 2.6									5.6	
Minneapolis	.....	99	....	.....	.....	.....	34.6	+ 7.2	61	8	43	11	23	26	29	....	....	....	1.67	+ 0.1	11	.....	nw.	32	s.	25	8	13	10	5.8	12.7
St. Paul	837	114	124	29.09	30.02	— .04	34.5	+ 7.0	61	8	43	11	23	26	31	30	24	72	1.96	+ 0.5	10	6,673	nw.	32	s.	25	8	13	10	5.8	18.2
La Crosse	730	70	78	.....	.....	.....	36.7	+ 5.9	61	21	45	10	4	28	37	....	....	....	1.99	+ 0.4	9	6,256	se.	30	nw.	16	14	8	9	5.1	7.5
Davenport	599	71	79	29.40	30.06	.00	40.6	+ 5.7	62	26	49	20	5	32	34	36	31	74	4.85	+ 2.7	12	5,611	sw.	32	w.	27	10	8	13	5.8	6.0
Des Moines	867	84	88	29.13	30.10	+ .04	39.8	+ 5.1	67	26	50	13	23	29	41	33	27	66	1.35	— 0.1	7	6,882	sw.	38	sw.	15	16	8	7	3.9	0.4

TABLE I.—*Climatological data for Weather Bureau Stations, March*, 1898—Continued.

Stations.	Elevation of instruments			Pressure, in inches.			Temperature of the air, in degrees Fahrenheit.										Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches.			Wind.					Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Total snowfall.
	Barometer above sea level, feet.	Thermometers above ground.	Anemometers above ground.	Mean actual, 8 a. m. and 8 p. m. +2.	Mean reduced.	Departure from normal.	Mean max. and min. +2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.					Total.	Departure from normal.	Days with .01, or more.	Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Maximum velocity. Direction.	Maximum velocity. Date.					
Up. Miss. Val.—Con																														
Dubuque	698	101	109	29.29	30.07	+ .03	37.6	+ 4.7	60	21	47	13	3	28	33	34	29	76	2.78	+ 0.5	12	5,802	s.	28	se.	15	17	5	9	4.4	5.1
Keokuk	614	64	78	29.41	30.09	+ .05	43.0	+ 5.4	65	*	52	19	23	34	31	37	32	72	5.98	+ 3.8	9	6,114	se.	31	w.	28	11	5	15	5.3	2.0
Cairo	359	87	93	29.70	30.10	+ .06	51.2	+ 4.4	78	22	60	28	3	42	38	47	43	79	9.20	+ 5.4	15	8,108	n.	36	n.	30	3	12	16	6.8	T.
Springfield, Ill.	644	82	92	29.39	30.10	+ .04	43.9	+ 4.7	69	16	52	24	6	36	32	39	34	74	9.65	+ 7.0	15	7,752	s.	36	w.	27	6	9	16	6.5	1.2
Hannibal	534	75	107	.....	.....	.....	44.2	+ 4.7	69	16	54	21	23	34	40	...	....	....	6.41	+ 4.0	11	7,362	se.	40	sw.	21	11	6	14	5.6	0.1
St. Louis	567	111	210	29.49	30.11	+ .05	47.2	+ 4.1	75	16	58	27	23	39	39	42	37	72	7.73	+ 4.2	14	7,358	s.	49	sw.	27	8	6	17	6.5	3.8
Missouri Valley.							39.0	+ 3.2										70	2.81	+ 1.0									5.3	
Columbia	.....	4	84	.....	.....	.....	45.4	+ 4.1	73	18	57	20	4	34	41	...	...	....	4.41	+ 1.4	12	7,145	se.	33	nw.	1	9	6	16	6.2	0.3
Kansas City	963	78	95	29.04	30.09	+ .02	45.0	+ 4.5	70	19	54	18	22	35	43	39	33	71	4.50	+ 2.3	12	6,721	se.	36	nw.	27	12	8	11	5.3	1.5
Springfield, Mo	1,324	100	103	28.64	30.06	+ .01	45.6	+ 2.1	73	16	54	19	24	37	37	41	36	73	9.05	+ 5.7	15	9,267	se.	37	nw.	27	7	11	13	6.1	2.5
Topeka	.....	81	....	.....	.....	.....	43.8	+ 2.8	72	21	54	16	23	33	43	...	...	...	4.21	+ 2.1	10	.....	se.	....	.....	...	6	16	9	....	0.2
Lincoln	1,199	74	84	28.72	30.05	— .02	39.2	+ 1.3	74	21	50	9	22	28	48	33	28	70	1.40	+ 0.1	5	9,908	s.	52	nw.	21	8	20	3	5.0	8.3
Omaha	1,103	92	97	28.88	30.06	— .01	39.2	+ 3.7	68	8	49	11	22	29	40	33	27	68	1.15	— 0.4	8	6,848	nw.	36	se.	14	12	10	9	4.6	7.3
Sioux City	1,139	96	164	.....	.....	.....	35.9	+ 4.3	67	14	46	6	22	26	41	...	...	....	0.90	— 0.4	8	11,334	s.	60	s.	14	11	10	10	5.2	4.8
Pierre	1,460	50	62	28.41	30.04	— .05	30.3	+ 0.9	67	7	42	— 1	22	18	45	25	19	69	0.60	— 0.3	9	7,962	nw.	53	w.	15	8	11	12	5.7	5.9
Huron	1,306	56	67	28.60	30.06	— .04	30.3	+ 2.7	67	8	42	— 4	23	19	46	25	20	72	0.84	0.0	6	9,986	nw.	51	se.	14	13	12	6	5.1	4.4
Yankton	1,234	52	58	.....	.....	.....	35.4	+ 5.4	68	8	46	2	22	24	52	...	...	...	1.00	— 0.2	7	8,606	nw.	50	s.	14	13	11	7	4.5	4.2
Northern Slope.							26.6	— 5.2										69	1.32	+ 0.5									5.8	
Havre	2,494	46	47	27.33	30.09	+ .04	18.8	—10.2	53	6	27	—20	26	10	36	18	15	83	1.06	+ 0.5	10	8,375	ne.	42	nw.	11	9	14	8	5.8	10.6
Miles City	2,372	41	49	27.45	30.07	— .01	24.0	— 7.4	66	7	32	—13	22	16	36	22	19	85	1.54	+ 1.0	16	6,046	n.	40	w.	15	8	8	15	6.2	13.4
Helena	4,108	88	93	25.78	30.07	+ .01	23.4	— 9.2	58	6	32	—16	22	14	40	21	15	69	2.39	+ 1.8	15	5,216	sw.	40	sw.	8	10	7	14	5.8	26.3
Rapid City	3,251	46	50	26.54	30.04	— .04	28.5	— 2.7	65	7	40	— 5	22	17	41	23	16	68	0.51	— 0.6	8	6,145	nw.	36	nw.	15	6	9	16	7.1	5.1
Cheyenne	6,105	58	60	23.85	30.10	+ .02	29.0	— 3.8	59	25	42	— 9	22	16	51	22	5	45	0.39	— 0.3	5	8,611	w.	51	w.	18	7	16	8	5.3	3.2
Lander	5,372	28	36	24.52	30.08	.00	27.1	— 3.8	60	7	39	— 9	22	15	47	23	16	65	2.73	+ 1.4	14	3,669	sw.	34	w.	8	6	16	9	5.9	26.6
North Platte	2,826	43	52	27.03	30.07	— .02	35.6	+ 0.5	73	8	48	— 1	23	23	45	29	22	65	0.64	— 0.1	5	7,980	nw.	48	nw.	14	18	9	4	4.3	6.6
Middle Slope.							41.9	— 0.4										66	0.88	— 0.6									5.1	
Denver	5,290	79	151	24.60	30.06	.00	35.7	— 3.1	67	8	50	0	22	22	48	27	9	42	0.28	— 0.7	7	6,859	s.	53	nw.	8	8	18	5	4.7	2.6
Pueblo	4,713	74	81	25.15	30.00	— .04	37.8	— 2.6	70	8	54	— 5	23	22	55	28	13	45	0.47	0.0	7	6,586	se.	50	sw.	18	12	13	6	4.4	3.9
Concordia	1,398	42	47	28.51	30.04	— .03	41.7	+ 2.7	76	21	53	10	22	31	39	34	27	63	1.00	— 0.8	5	6,879	s.	40	s.	14	10	15	6	4.9	0.8
Dodge City	2,504	44	52	27.35	30.02	— .01	42.6	+ 1.0	78	8	56	8	23	29	50	34	26	60	0.24	— 0.7	7	9,920	s.	59	sw.	14	12	11	8	5.2	1.9
Wichita	1,351	78	85	28.58	30.05	+ .01	44.4	+ 0.9	73	21	55	15	23	34	32	38	30	62	0.95	— 1.0	6	8,114	s.	36	n.	22	11	8	12	5.6	T.
Oklahoma	1,218	54	62	28.73	30.04	— .01	49.3	— 1.2	79	16	60	20	23	38	45	43	39	73	2.34	— 0.7	11	9,709	s.	36	s.	27	12	4	15	5.8	
Southern Slope.							51.2	+ 1.7										53	0.88	0.0									5.0	
Abilene	1,749	45	54	28.19	30.04	— .01	56.4	+ 2.3	87	26	68	23	23	45	39	48	40	62	1.41	+ 0.2	7	8,501	se.	32	nw.	27	8	14	9	5.2	0.1
Amarillo	3,691	54	61	26.19	30.02	— .02	46.0	+ 1.1	76	25	60	11	23	32	48	35	16	44	0.35	— 0.2	5	13,980	s.	60	sw.	21	11	10	10	4.8	0.3
Southern Plateau.							52.2	— 3.1										35	0.43	— 0.1									2.9	
El Paso	3,767	10	110	26.12	29.96	— .03	54.6	— 1.2	80	8	69	23	24	40	45	40	14	29	0.43	0.0	4	9,846	nw.	63	sw.	21	14	12	5	3.7	T.
Santa Fe	6,998	47	50	23.15	30.00	— .02	37.6	— 1.9	61	8	49	14	30	27	33	29	12	43	0.88	— 0.2	5	5,284	sw.	36	sw.	13	21	8	2	3.3	2.0
Phœnix	1,076	47	57	28.77	29.91	— .07	57.0	— 4.5	83	1	71	33	27	43	40	43	25	33	0.03	— 0.6	2	3,626	w.	24	sw.	13	19	9	3	2.5	
Yuma	139	16	50	29.79	29.94	— .05	59.7	— 4.8	86	8	74	34	24	46	44	46	29	36	0.39	— 0.1	2	6,664	w.	42	w.	13	22	7	2	2.1	
Middle Plateau.							55.8	— 5.7										60	1.15	— 0.2									5.2	
Carson City	4,720	82	92	25.21	30.07	+ .01	36.6	— 5.5	65	6	50	12	26	23	39	30	19	54	0.99	— 0.3	8	5,504	w.	54	sw.	25	14	14	3	3.6	12.2
Winnemucca	4,340	59	70	25.63	30.12	+ .06	34.4	— 6.3	63	6	48	4	16	21	40	30	24	66	0.75	— 0.1	8	.....	sw.	40	s.	25	10	15	6	4.7	4.3
Salt Lake City	4,344	83	90	25.58	30.09	— .01	36.3	— 5.3	63	7	45	11	23	27	33	31	23	60	1.71	— 0.3	11	5,148	nw.	36	sw.	25	6	7	18	7.3	15.3
Northern Plateau.							35.4	— 2.6										70	1.01	— 0.8									5.6	
Baker City	3,470	49	55	26.40	30.09	+ .03	33.6	— 1.9	56	5	43	11	22	24	31	28	20	60	0.27	— 1.5	8	4,721	nw.	34	nw.	21	8	9	14	6.1	1.9
Idaho Falls	4,742	10	56	25.15	30.10	+ .02	29.2	— 2.1	56	7	38	— 3	22	20	28	27	25	86	1.33	— 0.9	11	8,718	s.	43	sw.	8	12	7	12	5.4	15.8
Spokane	1,943	99	107	27.94	30.04	+ .02	37.0	— 2.7	59	6	45	11	22	29	27	33	25	64	0.92	— 0.5	11	5,013	s.	26	sw.	20	9	12	10	5.9	4.4
Walla Walla	1,018	65	73	28.96	30.07	+ .02	42.0	— 3.5	63	6	51	19	22	33	25	38	33	69	1.52	— 0.3	13	5,425	s.	34	sw.	20	6	18	7	5.2	7.5
N. Pac. Coast Reg.							42.9	— 2.1										75	2.38	— 3.0									5.8	
Fort Canby	179	10	34	29.90	30.10	+ .07	44.2	— 1.2	62	1	49	32	25	39	18	42	39	86	2.94	— 3.5	22	7,822	nw.	54	s.	27	7	8	16	6.5	T.
Port Angeles	29	47	62	.....	.....	.....	40.5	— 1.1	53	19	47	26	*	34	20	....	....	....	1.38	— 0.8	13	4,989	e.	30	w.	19	8	15	8	5.5	T.
Pysht	.....	5	....	.....	.....	.....	41.0	— 1.2	54	20	49	25	*	33	26	...	....	....	2.76	— 4.7	14	.....	w.	....	.....	...	14	3	14	....	1.0
Seattle	119	100	108	29.95	30.08	+ .06	43.4	— 2.0	60	1	50	29	22	37	24	40	34	72	1.39	— 2.1	13	4,388	se.	24	s.	23	7	16	8	5.5	4.2
Tacoma	213	113	120	.....	.....	.....	42.0	— 2.4	58	1	49	24	22	35	25	....	....	....	0.97	— 3.0	11	5,352	sw.	33	sw.	20	9	12	10	5.6	T.
Tatoosh Island	86	7	21	30.01	30.11	+ .09	43.1	— 1.2	56	1	47	33	25	39	16	40	34	72	3.49	— 5.6	14	10,052	e.	52	nw.	20	7	8	16	6.2	T.
Astoria	.....	18	....	.....	.....	.....	44.2	— 1.9	65	1	50	30	22	38	25	...	....	....	4.21	— 2.9	18	.....	w.	...	.....	...	11	9	11	....	0.2
Portland, Oreg	153	203	213	29.94	30.11	+ .07	43.8	— 3.4	63	6	51	27	22	36	26	39	34	71	2.17	— 3.4	13	6,355	nw.	44	sw.	19	7	17	7	5.5	1.5
Roseburg	521	56	67	29.55	30.12	+ .05	43.6	— 4.1	66	6	53	24	22	35	32	40	35	75	2.15	— 1.4	14	2,674	nw.	24	nw.	25	9	10	12	5.9	5.2
Mid. Pac. C'st Reg.							49.9	— 2.4										65	0.51	— 3.5									3.8	
Eureka	64	60	69	30.08	30.14	+ .07	45.6	— 3.0	61	1	51	30	22	40	22	43	40	82	1.80	— 4.7	15	5,370	nw.	43	nw.	9	14	8	9	5.3	
Redbluff	334	54	58	29.69	30.04	.00	52.4	— 2.1	76	11	64	30	17	40	33	43	30	48	0.01	— 3.3	1	5,198	n.	36	w.	12	25	4	2	2.0	
Sacramento	71	106	117	29.96	30.04	— .02	51.8	— 2.9	76	30	63	30	23	41	34	45	36	59	0.04	— 2.9	1	6,998	n.	42	n.	10	17	11	3	3.4	
San Francisco	153	161	167	29.92	30.08	.00	51.2	— 2.4	74	11	57	40	16	46	21	46	40	72	0.24	— 2.8	5	7,767	w.	40	w.	12	14	12	5	4.3	T.
Point Reyes Light	.....	12	....	.....	.....	.....	48.4	— 1.7	70	29	54	36	17	43	27	....	....	....	0.47	— 4.0	5	.....	nw.	....	.....	...	21	4	6	....	
S. Pac. Coast Reg.							53.9	— 1.6										62	0.88	— 1.3									3.2	
Fresno	332	67	70	29.64	30.00	— .03	52.8	— 1.7	80	31	66	30	22	40	35	44	33	55	0.71	— 0.6	5	3,781	nw.	29	n.	13	21	6	4	3.0	
Los Angeles	330	74	82	29.66	30.01	— .04	55.3	— 1.0	81	2	67	36	23	44	35	46	39	62	0.98	— 2.0	4	3,764	w.	24	nw.	13	15	14	2	3.1	
San Diego	87	94	102	29.91	30.01	— .06	54.5	— 1.5	77	29	62	38	14	47	27	48	42	68	0.91	— 0.6	5	4,949	nw.	30	sw.	26	21	2	8	3.2	
San Luis Obispo	201	10	46	29.84	30.06	.00	52.9	— 2.3	79	4	66	28	18	40	44	45	38	64	0.91	— 2.1	5	3,902	n.	22	w.	21	18	9	4	3.4	

NOTE.—The data at stations having no departures are not used in computing the district averages. Letters of the alphabet denote number of days missing from the record. *Two or more dates. †Received too late to be considered in departures, etc.

TABLE II.—*Meteorological record of voluntary and other cooperating observers, March, 1898.*

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Alabama.	°	°	°	*Ins.*	*Ins.*
Alco †	87	29	63.2	2.07	
Ashville †	85	25	58.2	3.04	
Bermuda †	85	29	63.4	3.16	
Birmingham †	84	30	61.3	3.70	
Bridgeport †				3.23	
Citronelle †	82	36	61.3	0.34	
Clanton †	82	30	59.2	2.15	
Decatur †	82	25	56.2	3.92	
Demopolis				2.35	
Elba †	85	28	61.8	2.10	
Eufaula *a* †	89	31	62.0	2.23	
Eufaula *b*				2.22	
Florence *a* †				3.93	
Florence *b* †	81	28	57.3	4.38	
Fort Deposit	86	34	62.8	2.90	
Gadsden	83	28	57.5	2.99	
Goodwater	84	26	58.4	2.29	
Greensboro †	85	31	60.1	1.99	
Hamilton	84	23	57.4	3.94	
Highland Home †	83	32	62.1	2.61	
Jasper	86	23	54.8	4.25	
Livingston	85	31	60.6	2.56	
Lock No. 4	81	26	57.0	4.11	
Madison Station †	82	25	56.2	3.42	
Marion †	84	32	61.2	3.20	
Mount Willing †	85	29	63.1	2.50	
Newbern †	84	31	60.6	2.45	
Newburg				5.41	
Newton †	85	30	61.4	1.73	
Oneonta	80[c]	24	56.6[c]	3.31	
Opelika †	83	30	59.0	3.15	
Oxanna †	81	24	57.0	3.79	
Pineapple				2.40	
Pushmataha †	86	32	61.6	2.51	
Riverton †	84	24	55.4	4.36	
Rockmills †				4.34	
Scottsboro †	80	26	57.6	3.75	
Selma †	86	30	61.6	2.08	
Sturdevant				2.51	
Talladega	83	28	59.2	3.93	
Tallassee				3.70	
Thomasville	83	33	61.4	2.10	
Tuscaloosa †	86	29	60.0	4.91	
Tuscumbia	81	29	56.8	4.15	
Union †	85			4.02	
Union Springs †	85	29	61.8	3.31	
Uniontown †	85	35	62.0	3.34	
Valleyhead	81	24	56.0	3.67	
Warrior				4.74	
Wetumpka	86	31	62.0	3.03	
Wilsonville †				2.62	
Arizona.					
Arizona Canal Co. Dam.	84	33	60.0	0.10	
Benson *[5]	75	41	55.2	0.00	
Bisbee †	73	31	50.2	1.94	
Buckeye †	89	28	58.1	0.10	
Calabasas	76	30	51.6	1.21	
Camp Creek	82	30	53.0	0.27	
Casa Grande *[5]	68	42	55.1		
Cedar Springs	79	24	49.6	1.27	1.3
Congress	77	32	54.5	0.41	T.
Dragoon				0.84	
Dragoon Summit *[5]	71	30	54.7	0.00	
Dudleyville	80	26	53.6	0.72	
Empire Ranch		21		0.38	
Flagstaff †	64	2	36.2	2.87	28.7
Fort Apache	68	16	42.7	1.08	1.5
Fort Defiance	57	1	35.0	1.04	6.8
Fort Grant †	74	31	50.8	0.53	
Fort Huachuca †	74	25	49.5	1.26	
Fort Mohave	92	32	59.9	0.00	
Gilabend *a* *[5]	84	40	60.3	0.49	
Holbrook †	68	7	41.3	0.90	5.5
Jerome	85	23	52.3	T.	T.
Lochiel *[1]	71	30	48.5	1.75	
Marioopa *[5]	91	40	65.9	0.14	
Mesa †	80	32	55.0	0.44	
Mount Huachuca	76	25	47.9	3.11	
Music Mountain	78	20	49.1	0.17	
Natural Bridge				0.81	
Oracle	70	27	49.7	1.38	
Oro				0.98	
Oro Blanco	77	27	50.4	1.07	
Pantano *[5]	78	40	55.5	0.27	
Parker	89	27	59.2	0.54	
Payson				3.89	
Peoria †	81	34	56.8	0.06	
Phœnix	82	29	52.3	0.00	
Pinal Ranch				1.39	
St. Helena Ranch				0.35	0.1
San Carlos †	81	25	54.0	0.00	
San Simon *[5]	80	32	54.3		
Showlow				0.31	3.5
Signal †	82	29	54.8	0.27	
Snowflake	64	13	41.4	0.32	1.2
Strawberry	64	3	39.1	1.04	4.5
Arizona—Cont'd.	°	°	°	*Ins.*	*Ins.*
Sulphur Spring Valley				0.40	
Texas Hill *[5]	90	37	60.2	0.35	
Tombstone	75	27	51.4	0.69	T.
Tuba	64	14	40.7	T.	T.
Tucson *c* †	82	25	55.8	0.63	
Walnut Grove				0.07	T.
Whipple Barracks †	72	15	44.5	0.22	
White Hills	80	26	52.6	0.35	T.
Willcox *[5]	68	32	42.7	0.28	
Williams	61	0	34.4	0.90	9.0
Arkansas.					
Amity	81	24	55.4	1.96	
Arkansas City †				2.95	
Beebranch [f]	81	25	53.0	6.75	
Blanchard Springs †	86	25	59.0	3.88	
Brinkley	82	30	57.7	4.68	
Camden *a* †				2.57	
Camden *b* †	85	28	57.4	2.45	
Canton *[1]	80	22	51.2		
Conway	85	24	55.8	4.70	
Corning	81	25	50.8	9.65	T.
Dallas	83	25	54.2	7.51	
Dardanelle				7.18	
Elon †	86	25	60.0	2.42	
Fayetteville †	79	19	49.5	15.07	1.0
Forrest	81	28	56.4	4.73	
Fulton †				1.20	
Hardy	80	22	50.2	9.85	
Helena *a* †				3.66	
Helena *b*	86	32	60.2	2.83	
Hot Springs *a*	85	28	56.6	1.58	
Hot Springs *b*				1.94	
Jonesboro	81	27	54.2	5.70	
Keesees Ferry †	84	30	50.2	15.08	1.0
Lacrosse †	88	24	51.2	10.74	
Lonoke *[1]	85	30	56.8	3.30	
Luna Landing *[6]	84	30	59.6	1.90	
Lutherville *[1]	83	26	54.6		
Magnolia	88	30	58.6	2.54	
Malvern †	85	30	56.9	2.90	
Marianna *[1]	83	32	58.2		
Marvell	84	29	58.6	3.55	
Mena *[1]	78	25	54.6	6.51	
Monticello	85	28	56.9	3.21	
Moore	76	30	54.3	5.46	
Mossville	75	22	47.4	17.17	
Mount Nebo †	75	26	50.8	8.09	
New Gascony *[1]	83[4]	28[4]	57.7[4]	3.06	
Newport *a* †				4.94	
Newport *c* †	81	26	55.0	4.93	
Oregon *[1]	76	18	46.8		
Osceola	88	28	54.2	3.31	
Ozark †	84	28	53.9	10.15	
Picayune †	87	25	54.8	2.73	
Pinebluff †	86	30	58.6	2.82	
Pocahontas †	79	26	51.8	11.83	
Powell *† [1]	80	21	50.6	16.25	1.0
Prescott	88	30	59.1	2.07	
Rison	86	26	57.1	2.38	
Russellville	83	24	52.4	8.21	
Silver Springs †	79	18	49.6	15.02	2.5
Spielerville	87	25	54.2	9.24	
Stamps	86	30	57.6	1.38	
Stuttgart †	83	26	56.7	3.95	
Texarkana †	86	28	54.2	1.46	
Warren †	86	28	54.3	3.09	
Washington *† [1]	84	31	58.1	1.43	
Wiggs *[1]	85	24	61.1	2.24	
Winslow	75	19	48.0	17.56	1.0
Witts Springs †	76	21	50.0	9.71	0.8
California.					
Agnew	74	28	51.0	0.51	
Arlington Heights	83[4]	31	53.5	0.80	
Athlone *[1]	79	32	48.7	1.07	
Ballast Point L. H				1.07	
Bear Valley				2.35	23.5
Berkeley	73	36	50.8	0.31	
Bishop †	69	12	40.4	T.	T.
Boca *[1]	60	— 4	28.4	2.50	25.0
Bodie †	51	—16	23.2	0.94	12.0
Bowmans Dam *† [1]	60	10	33.9	2.63	13.0
Caliente *[1]	73	35	52.3	1.45	
Campbell	75	27	50.0	0.84	
Cape Mendocino L. H				2.10	
Cedarville †	63	6	36.1	0.51	5.0
Centerville *[1]	80	41	55.2	0.88	
Chico *[1]	78	32	54.0	0.19	
Chino *[5]	78	30	52.4	1.51	
Cisco *[1]	48	5	27.1		13.0
Claremont †	78	28	51.4	1.20	
Corning *[1]	75	26	45.8		
Craftonville	80	22	53.4	1.08	
Crescent City †	62	30	45.6	2.04	T.
Crescent City L. H				2.47	
Daunt				2.40	
Delano *[1]	77	36	51.2	0.38	
California—Cont'd.	°	°	°	*Ins.*	*Ins.*
Delta *[1]	72	24	45.9	0.00	
Descanso				4.11	5.5
Drytown	76	26	49.8	0.95	
Dunnigan *[1]	76	35	50.0	0.25	
Durham *[1]	74	28	50.6	0.23	
East Brother L. H				0.25	
Elsinore	93	24	54.8	0.82	
Escondido	89	20	50.8	1.53	
Fallbrook *[1]	83	35[c]	52.4	1.48	
Folsom City *[1]	79	34	52.8	0.22	
Fordyce Dam				2.19	16.0
Fort Bragg †				0.79	
Fort Ross	67	33	48.7	0.40	
Georgetown	70	23	46.2	1.80	18.0
Glendora				1.12	
Grand Island *[5]	79	32	53.5	T.	
Grass Valley				0.66	T.
Greenville †	69	11	38.9	0.55	3.0
Healdsburg *[1]	70	25	49.0	0.43	
Hill Ranch	93	28	56.4	0.81	T
Hollister	79	26	50.6	0.61	
Humboldt L. H				1.52	
Hydesville	68	28	46.2	1.62	
Indio *[1]	89	29	58.1	0.30	
Iowa Hill *[1]	67	24	42.4	1.68	3.5
Jackson	86	20	50.1	1.18	5.0
Jolon				0.60	
Keene *[1]	70	22	46.3	2.04	4.0
Kennedy Gold Mine	72	25	48.8	0.88	T.
Kingsburg *[1]	75	35	55.5	0.62	
King City *[1]	72	28	50.2	0.54	
Kono Tayee	71	32	50.0	0.11	
Lagrange *[5]	82	31	54.6	1.87	
Laporte *† [1]	56	15	32.7	1.62	16.0
Las Fuentes Ranch				0.47	
Lemoore *a* *[1]	79	30	52.9	0.42	
Lick Observatory	60	21	39.1	2.40	22.0
Limekiln	82	31	54.9		
Lime Point L. H				0.33	
Lodi	77	29	52.0	0.98	
Los Alamos				0.80	
Los Gatos *b*	70	34	49.2	0.82	
Lytton Springs	76	30	52.0	0.37	
Malakoff Mine *[1]	69	25	44.2	0.79	
Mammoth Tank *[1]	88	50	63.8		
Manzana	73	19	42.6	0.47	1.5
Mare Island L. H				0.42	
Merced *[1]	83	34	51.8	1.34	
Mills College				0.24	
Milton (near) *[1]	73	33	44.6	0.62	
Modesto *[1]	86	33	55.4	0.35	
Mohave *[1]	77	26	48.3	0.00	
Mokelumne Hill *[5]		29	46.0	1.18	
Monterey *[1]	68	36	53.4	1.27	
Mount Tamalpais	69	28	46.6	0.73	
Mutah Flat				0.80	6.5
Napa *b*	77	26	50.1	0.14	
Needles	85	37	60.8	0.13	
Nevada City	67	23	43.2	0.87	
Newhall *[1]	82	30	44.3	0.00	
North Ontario	76	30	51.0	1.55	
North San Juan *[1]	72	24	43.8	0.54	0.2
Oakland *a*	74	35	51.3	0.25	
Ogilby *[1]	85	45	63.8		
Oleta *[1]	69	26	45.3	1.36	T.
Orangevale †	72	30	50.4	0.58	
Orland *[1]	75	30	56.4	T.	
Palermo	75	27	50.6		
Paso Robles *b*	76	26	49.2	0.83	
Peachland *[5]	76	29	51.7	0.16	
Piedras Blancas L. H				0.46	
Pigeon Point				0.19	
Pilot Creek				3.06	24.5
Pine Crest	76	37	55.9	0.64	
Placerville	68	22	44.1	1.28	
Point Ano Nuevo L. H				0.32	
Point Arena L. H				0.67	
Point Bonita L. H				0.56	
Point Conception L. H				0.38	
Point Fermin L. H				0.50	
Point Hueneme L. H				0.86	
Point Lobos	64	36	49.3	0.17	
Point Loma L. H				0.65	
Point Montara L. H				0.31	
Point Pinos L. H				1.45	
Point Reyes L. H				0.47	
Point Sur L. H				1.11	
Pomona (near)	83	27	53.1	1.22	
Poway *[5]	84	33	48.6	1.75	
Quincy †	64	17	39.5	0.20	1.5
Redding *b* †	75	29	51.9	0.00	
Represa	70	32	49.9	0.30	
Rio Vista	77	30	52.8	0.29	
Roe Island L. H				1.15	
Rosewood	75	21	47.8	0.16	T.
Sacramento *a*	77	28	52.8	0.07	

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
California—Cont'd.	°	°	°	*Ins.*	*Ins.*
Salinas *1	68	32	53.4	0.91	
Salton *1	95	36	57.8	0.35	
San Bernardino †	82	27	52.5	0.97	
San Jacinto	80	23	50.9	0.81	
San Leandro *1	82	38	54.0	0.39	
San Luis L. H.	.....	.....	.....	0.84	
San Mateo *1	75	39	54.7	0.64	
San Miguel *1	76	28	49.8	0.93	
Santa Barbara *a*	78	34	54.4	0.28	
Santa Barbara L. H.	.....	.....	.....	0.25	
Santa Clara *a*	.....	.....	.....	0.60	
Santa Cruz *b* †	76	29	51.6	1.39	
Santa Cruz L. H.	.....	.....	.....	1.16	
Santa Maria	80	29	53.8	0.65	
Santa Monica *1	78	34	57.4	1.15	
Santa Paula	79	30	52.2	1.55	
Santa Rosa *1	77	28	52.1	0.66	
Saticoy	.....	.....	.....	0.44	
Shasta	.....	.....	.....	T.	
Sierra Madre	77	35	53.8	1.23	
Sneddens Ranch *1	64	0	29.0	0.65	8.0
Stanford University [1]	70*	30	49.5	0.32	
Stockton *a*	74	31	51.2	0.84	
Summerdale †	57	12	35.4	3.36	27.0
Susanville †	60	13	36.6	0.35	4.0
Sutter Creek *5	68	24	43.8	0.75	
Tehama *1	74	32	52.1	0.00	
Templeton *1	76	28	46.0	1.05	
Trinidad L. H.	.....	.....	.....	2.34	
Truckee *1	64	0	33.0	2.05	20.5
Tulare *b*	.....	.....	.....	0.94	
Tulare *c*	92	24	54.9	0.72	
Turlock *1	80	42	55.3	0.72	
Upperlake	79	24	48.4	0.36	T.
Upper Mattole *1	80	32	50.6	1.55	
Vacaville *a* *1	78	32	52.9	0.19	
Ventura †	83	29	50.9	0.68	
Visalia	80	22	50.6	0.74	
Volcano Springs *1	92	47	62.6	0.00	
Walnut Creek	78	28	52.7	0.29	
West Palmdale *1	73	24	45.2	0.90	
Westpoint	.....	.....	.....	3.22	17.5
Wheatland †	73	29	50.3	0.02	
Williams *1	75	31	53.6	T.	
Wilmington *5	78	41	59.3	.....	
Wire Bridge *5	74	28	49.8	0.40	
Yerba Buena L. H.	.....	.....	.....	0.62	
Yreka †	71	16	41.6	0.42	5.5
Colorado.					
Altman	48	—10	22.0	1.60	22.0
Antlers †	58	— 4	34.8	1.01	4.0
Arkins	.....	.....	.....	0.87	10.0
Boulder	62	0	35.7	0.67	7.5
Boxelder	.....	.....	.....	0.58	5.0
Breckenridge †	48	—22	16.4	1.16	16.2
Canyon †	71	7	39.6	0.71	5.0
Castlerock	54	— 6	31.8	0.40	4.0
Cedaredge	61	— 4	35.2	1.06	8.5
Cheyenne Wells	72	—12	35.7	0.61	2.0
Collbran	.....	.....	.....	1.60	16.0
Colorado Springs †	63	— 5	33.7	0.28	4.9
Cope	72	— 1	35.6	0.45	1.5
Crook	70	— 1	33.6	0.35	3.5
Delta	65	3	37.8	0.21	T.
Dumont †	.....	.....	.....	0.65	6.5
Durango	57	10	96.0	1.17	12.5
Fleming	.....	.....	.....	1.07	10.5
Fort Collins †	66	— 6	32.7	0.50	5.2
Fort Morgan	69	— 4	34.0	0.02	T.
Fox	.....	.....	.....	0.77	.....
Garnett	53	— 2	31.6	0.35	3.5
Georgetown	53	— 7	27.4	.....	.....
Gleneyrie †	62	— 3	33.9	0.48	7.0
Grand Junction †	62	13	40.4	1.05	5.5
Greeley †	69	— 5	34.0	0.23	.....
Hamps	70	— 5	32.3	0.20	2.5
Hoehne	70	2	38.4	0.34	.....
Holly	.....	.....	.....	0.10	1.0
Holyoke	.....	.....	.....	T.	T.
Holyoke (near)	75	— 2	33.6	0.22	.....
Hugo	.....	.....	.....	0.45	4.5
Husted †	67	—12	34.0	0.31	4.0
Lake Moraine †	52*	—11*	22.8*	1.58	29.8
Lamar †	80	6	41.6	1.06	10.0
Laporte	.....	.....	.....	0.45	4.5
Las Animas †	74	2	39.6	0.40	6.0
Leadville (near) *† [1]	50	—13	18.2	0.61	13.3
Leroy †	68	— 3	33.3	0.67	5.9
Longs Peak	52	—14	25.6	0.75	13.2
Meeker	57	—14	30.4	0.73	8.5
Millbrook	56	— 7	30.0	1.61	15.5
Minneapolis †	80	5	41.0	0.40	4.0
Moraine †	49	—10	25.9	1.32	16.5
Pagoda †	59	—14	29.2	1.65	16.5
Paonia †	.....	.....	.....	0.26	0.7
Parachute †	61	— 1	31.4	0.85	8.0
Colorado—Cont'd.					
Rangely †	55	2	29.0	0.52	5.5
Redcliff	.....	.....	.....	0.87	12.6
Rico	50	—18	24.3	3.80	38.0
Rockyford	74	2	40.0	0.16	1.0
Ruby	.....	.....	.....	9.25	92.5
Saguache †	55	5	30.2	0.10	1.0
Salida	61	—10	33.5	0.47	6.2
San Luis †	59	— 2	32.5	0.60	6.0
Santa Clara *1	60	— 1	30.8	1.65	17.5
Seibert †	.....	.....	.....	0.40	4.0
Smoky Hill Mine	65	—12	30.6	0.80	8.0
Springfield	.....	.....	.....	0.55	5.5
Stamford *1	48	— 8	23.2	1.40	19.0
Steamboat Springs	49	—25	24.2	0.83	12.0
Strickler Tunnel	.....	.....	.....	1.48	29.0
T. S. Ranch †	60	0	38.3	1.30	14.0
Wagon Wheel	44	—14	19.7	1.20	24.0
Walden	50	—21	22.1	1.14	18.5
Wallet	.....	.....	.....	0.20	2.0
Wray †	76	0	36.2	0.83	4.5
Yuma	.....	.....	.....	0.31	3.0
Connecticut.					
Canton †	63	13	41.0	2.25	1.0
Colchester	64	18	41.4	2.86	5.0
Falls Village	.....	.....	.....	2.44	4.0
Greenfield Hill	.....	.....	.....	2.96	6.4
Hartford *a*	61	22	42.6	2.31	3.0
Hartford *b*	.....	.....	.....	2.54	4.0
Hawleyville	.....	.....	.....	2.33	7.2
Lake Konomoc	.....	.....	.....	2.66	.....
Middletown	66	19	43.6	2.90	9.5
New London †	62	24	37.8	3.66	3.0
North Grosvenor Dale	62	20	41.5	2.41	.....
Pomfret	61	22	40.2	2.62	6.5
Southington	62	18	41.6	2.38	8.2
South Manchester	.....	.....	.....	3.64	14.0
Storrs	62	19	40.2	3.09	3.2
Voluntown †	67	18	42.0	3.08	8.0
Waterbury	62	21	42.2	2.47	2.0
West Cornwall †	58	16	39.2	2.37	4.5
West Simsbury	.....	.....	.....	2.14	1.5
Windsor	62	20	41.4	2.63	2.9
Winsted *1	60	16	37.8	.....	.....
Delaware.					
Dover	78	23	48.1	2.19	
Milford	77	27	50.0	3.11	
Millsboro	75	22	47.6	2.45	
Newark	73	23	46.2	2.48	2.0
Seaford	72	23	49.2	3.13	
District of Columbia.					
Distributing Reservoir *5	71	25	49.3	.....	.....
Receiving Reservoir *5	74	26	48.6	.....	.....
West Washington	80	23	49.0	2.92	0.7
Florida.					
Archer †	90	37	66.6	0.54	
Bartow	94	34	70.2	0.66	
Boca Raton †	82	49	71.8	2.71	
Brooksville †	87	40	67.1	0.15	
Carrabelle †	79	42	65.3	1.10	
Clermont †	91	45	70.8	0.99	
De Funiak Springs	84	30	63.6	2.03	
Earnestville	89	43	70.1	0.47	
Eustis †	89	41	69.8	0.64	
Federal Point †	87	36	66.0	1.30	
Fort Meade	90	34	67.5	1.60	
Frostproof	96	39	71.3	1.82	
Gainesville	86	39	66.4	0.83	
Grasmere †	86	40	68.4	0.41	
Haywood	85	36	66.1	2.44	
Huntington	89	43	67.7	0.94	
Jasper	88	34	65.0	2.51	
Kissimmee	88	37	68.6	0.00	
Lake Butler	88	39	70.3	1.48	
Lake City †	90	37	67.0	1.60	
Lemon City	85	50	72.1	2.60	
Macclenny †	90	36	66.6	1.49	
Manatee	89	39	66.7	0.37	
Merritts Island	85	47	69.9	0.68	
Myers †	88	42	64.2	0.46	
New Smyrna	88	38	66.4	1.70	
Ocala †	92	37	68.2	1.24	
Orange City	88	35	67.9	0.61	
Orange Park	86	37	64.8	2.03	
Orlando †	87	40	67.6	0.54	
Plant City	90	36	69.4	0.52	
St. Andrews	84	38	65.8	1.82	
St. Francis †	88	33	66.3	1.19	
St. Francis Barracks	86	42	65.6	0.90	
Sebastian	83	53	70.4	1.50	
Stephensville	.....	.....	.....	1.90	
Switzerland *1	86	42*	65.4*	1.88	
Tallahassee †	87	37	66.0	2.16	
Tarpon Springs †	90	44	69.4	0.26	
Wausau	84	32	64.6	2.59	
Georgia.					
Adairsville †	81	29	56.4	3.54	
Georgia—Cont'd.					
Alapaha	89	31	62.2	2.35	
Albany †	87	39	65.3	1.85	
Allentown †	89	29	63.5	1.13	
Americus †	87	31	63.5	1.42	
Athens *b* †	80	33	57.0	3.55	
Belleville	90	35	65.4	1.30	
Blakely †	85	35	64.0	2.30	
Brag	89	35	65.4	1.15	
Canton †	.....	.....	.....	5.82	
Cartersville	82	30	58.6	3.49	
Cedartown	82	27	56.8	4.17	
Clayton †	81	22	53.4	8.52	
Columbus	86	35	62.0	1.71	
Covington	81	31	56.8	3.59	
Crescent	88	33	64.0	1.65	
Dahlonega †	81	24	54.6	4.60	T.
Diamond	79	21	53.0	6.28	
Elberton †	85	32	60.0	4.50	
Fitzgerald	88	30	62.6	2.13	
Fleming †	88	32	63.4	1.15	
Fort Gaines	86	32	63.1	2.23	
Franklin	80	31	59.1	3.92	
Gainesville	81	28	54.8	4.41	
Gillsville †	83	25	57.1	3.54	
Greenbush	80	28	55.0	5.39	
Hawkinsville	88	30	59.7	0.91	
Hephzibah	.....	.....	.....	1.90	
Jesup	89	31	63.4	1.35	
Lagrange †	85	30	60.9	3.59	
Lawrenceville	75	39	57.7	2.49	
Leverett	87	29	58.8	4.18	
Louisville	88	36	63.5	1.33	
Lumpkin	85	35	61.6	1.93	
Marietta	81	28	56.4	4.70	
Marshallville †	85	31	63.6	2.00	
Millen	88	34	62.8	1.15	
Morgan †	86	30	61.4	1.71	
Mount Vernon	.....	.....	.....	1.85	
Newnan	80	31	58.2	4.74	
Piscola	85	34	65.1	2.60	
Point Peter	83	29	56.2	4.25	
Poulan †	88	28	62.6	2.08	
Quitman †	87	30	63.8	2.25	
Ramsey	81	23	57.4	5.38	
Resaca	.....	.....	.....	4.27	
Reynolds	.....	.....	.....	2.00	
Rome †	82	28	56.6	3.53	
Talbotton †	82	32	60.5	2.93	
Tallapoosa	82	29	57.5	3.88	
Thomasville †	86	35	64.4	2.85	
Toccoa †	83	29	56.4	5.58	
Washington †	.....	.....	.....	3.97	
Waycross	86	34	63.0	1.58	
Whitesburg †	.....	.....	.....	3.40	
Idaho.					
Albany Falls	51	— 1	33.5	1.55	11.0
American Falls	58	1	32.4	0.25	5.0
Blackfoot †	59	— 6	32.2	T.	T.
Boise Barracks †	64	12	38.2	0.75	4.0
Burnside †	55	— 6	24.8	0.05	2.0
Challis	58	— 4	36.2	0.29	1.0
Chesterfield	50	3	28.4	T.	T.
Corral *1	41	— 3	24.1	0.70	5.0
Downey	52	0	29.0	0.86	8.6
Fort Sherman †	56	3	34.4	2.08	8.3
Gimlet †	53	—14	26.4	0.60	4.0
Gray	50	—25	22.8	2.00	20.0
Idaho City †	58*	— 4*	32.2*	1.67	15.2
Kootenai †	62	3	34.8	1.10	11.0
Lake	34	—24	15.6	2.00	20.0
Lakeview	50	8	34.4	2.11	.....
Lewiston [1]	58	16	39.6	1.03	.....
Lost River	57	— 1	28.4	0.20	2.0
Marysville	48	— 9	22.8	1.90	19.0
Minidoka	61	—12	27.2	0.60	6.0
Moscow	59	5	30.9	1.80	14.5
Murray †	50	— 6	32.6	3.23	43.0
Nampa	65	13	37.8	0.28	1.5
New Plymouth	74	13	40.0	.....	.....
Oakley	65	8	35.0	0.30	3.0
Ola †	57	8	35.2	0.55	3.3
Paris	55	—19	21.8	1.49	20.7
Payette †	71	13	42.8	T.	T.
Pollock †	64	12	39.3	0.78	T.
Rexburg	55	1*	26.7*	0.10	.....
St. Maries	59	2	36.1	2.49	16.5
Salubria	59	12	37.4	0.25	1.2
Soldier †	51	—10	23.6	0.28	2.0
Swan Valley †	52	—24	27.6	1.61	20.0
Warren †	70	—26	26.5	2.37	.....
Weston	61	3	33.0	2.02	19.5
Yellow Jacket	.....	.....	.....	0.64	.....
Illinois.					
Albion †	77	22	48.8	12.39	
Alexander †	70	20	44.6	5.25	0.5
Ashton *† [1]	62	11	38.6	4.78	7.5

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Illinois—Cont'd.	°	°	°	*Ins.*	*Ins.*
Atwood *a* [*3]	68	16	40.6	10.89	2.0
Atwood *b*				8.03	
Aurora *a*	70	14	41.3	5.09	0.9
Aurora *b*	69	13	40.6	5.65	2.7
Beardstown				9.60	
Bloomington †	70	12	43.6	5.65	6.0
Bushnell †	66	22	44.0	5.90	1.0
Cambridge	64	18	40.4	6.15	8.8
Carlinville †	74	22	45.9	7.49	2.0
Carlyle				11.93	
Carrollton	67	18	44.1	6.36	1.5
Charleston	70	18	44.9	8.90	3.4
Chemung	61	3	37.2	4.25	3.8
Chester				8.90	0.0
Cisne †	76	21	48.4	11.99	
Coatsburg	66	20	42.2	7.09	0.6
Cobden †	77	24	49.4	14.16	T.
Danville	73	13	44.9	7.93	4.0
Decatur †	69	18	44.4	9.85	2.0
Dixon †	64	2	38.9	4.74	10.0
Dwight †	70	13	41.5	6.64	3.0
East Peoria †	71	16	43.2	6.90	3.0
Effingham †	75	21	46.6	12.77	1.2
Elgin	67	10	39.3	5.08	2.0
Equality	79	26	50.7	9.29	T.
Fort Sheridan †	67	13	38.9	3.13	1.6
Friendgrove †				11.48	
Galva †	66	13	39.8	5.43	6.5
Glenwood *† [1]	69	4	40.8	5.05	
Golconda †	79	23	51.2	8.93	
Grafton †				8.01	
Grayville	75	26	51.7	11.37	T.
Greenville †	71	21	44.3	9.73	2.6
Griggsville †	71	22	44.1	5.78	T.
Halliday [*5]	75	25	49.0	7.96	
Havana †	70	25	45.0	4.84	2.0
Hillsboro †	74	22	46.0	7.78	1.0
Joliet †	74	19	43.1	6.12	1.1
Kankakee *a*	72	13	44.3	7.69	3.0
Kishwaukee	62	3	37.1	4.96	5.2
Knoxville *a*	65	18	41.0	5.90	2.1
Lagrange †	70	13	40.9	5.87	2.0
Laharpe [*6]	68	21	45.6	5.12	1.5
Lanark †	63	0	37.8	2.66	7.7
Lexington	68	12	43.1	5.17	6.2
Loami †				5.97	0.5
McLeansboro †	76	22	49.3	11.11	
Martinsville †	75	20	46.2	9.64	1.5
Martinton †	69	14	42.8	4.38	1.8
Mascoutah	76	24	46.5	11.33	3.2
Mattoon	73	20	45.0	7.15	3.0
Minonk †	68	10	4	5.00	6.5
Monmouth †	64	18	0	3.65	3.8
Morrisonville †	68	20	44.2	6.72	1.2
Mount Carmel †				11.35	0.0
Mount Pulaski	70	19	44.9	9.90	3.0
Mount Vernon	76	17	48.0	11.94	
New Burnside †	77	23	51.1	8.51	T.
Olney *a*	75	21	47.4	10.97	2.5
Oswego *[1]	68	11	38.8	4.11	1.0
Ottawa †	69	9	41.0	5.21	5.5
Palestine †	75	23	47.6	11.45	T.
Paris	70	14	42.8	8.34	T.
Peoria *a* †				6.05	5.2
Peoria *b* †	70	21	43.2	5.74	2.0
Philo †	71	10	43.4	8.71	4.0
Plumhill †	76	20	47.4	13.05	
Rantoul †	69	11	43.4	7.20	6.0
Reynolds	62	17	39.4	5.52	5.0
Riley †	63	9	38.0	4.76	3.0
Robinson †	75	21	47.0	14.01	3.2
Rockford	61	8	39.6	4.21	5.2
Roundgrove †	65	11	39.5	4.42	3.6
St. Charles *† [1]	63	12	39.1	5.29	1.8
St. John †				9.98	
Scales Mound	62	4	36.4	2.84	6.0
Streator †	72	12	44.5	6.93	6.0
Sycamore †	64	10	38.2	5.42	2.0
Tilden	75	26	47.3	9.95	T.
Tiskilwa †	67	12	40.0	6.17	5.5
Tuscola †	71	14	43.0	8.86	4.3
Walnut †	64	14	40.8	5.22	4.7
Wheaton [*3]		18	37.0	6.04	2.5
Winchester *[1]	68	22	42.7	5.55	T.
Winnebago †	61	9	37.5	3.95	7.0
Zion †	63	13	38.2	3.83	7.5
Indiana.					
Anderson †	71	20	45.6	6.59	5.8
Angola *[5]	68	13	40.4	5.92	0.9
Auburn	70	16	43.3	5.88	
Bloomington †	74	24	46.6	10.30	4.0
Bluffton †	73	18	44.3	6.01	3.5
Boonville	77	25	51.2	8.45	T.
Bright †	74	18	45.6	7.93	T.
Butlerville †	75	25	48.1	9.56	2.0
Cambridge City †	75	15	45.4	11.04	3.5
Indiana—Cont'd.					
Columbia City *[1]	67	16	41.7	5.54	1.0
Columbus †	75	20	46.7	6.94	3.0
Connersville †	76	21	46.0	10.93	2.2
Crawfordsville	75	22	48.1	11.20	1.3
Delphi †	73	18	43.0	6.18	3.5
Edwardsville *† [1]	76	28	50.9	11.08	2.0
Farmland †	74	17	45.4	7.26	4.0
Fort Wayne	72	16	44.0	4.57	0.5
Franklin *[1]	78	25	46.5	8.83	3.5
Greencastle †	72	23	44.9	10.62	3.2
Greensburg	71	21	44.8	10.84	2.5
Hammond †	67	11	41.3		
Hector	72	12	42.4	5.21	6.0
Huntington	72	19	42.7	5.67	1.3
Jasper †	74	24	50.0	9.70	2.0
Jeffersonville	74	29	50.1	10.10	1.0
Knightstown †	78	20	45.3	10.87	4.0
Kokomo †	73	20	45.8	7.46	2.0
Lafayette †	73	19	44.0	7.20	6.3
Laporte	68	18	40.6	4.78	T.
Logansport *b* †	72	20	42.2	8.63	1.1
Madison	73	22	48.2	9.09	6.0
Marengo †	77	21	49.2	9.22	0.2
Marion †	68	17	43.1	6.17	2.5
Markle	71			2.94	1.0
Mauzy †	74	19	45.7	10.67	6.4
Michigan City *[10]	66	24	41.0		
Mount Vernon †	77	25	48.7	8.91	T.
Northfield †	72	18	43.9	9.91	4.0
Paoli	76	20	49.0	7.92	1.5
Princeton *[1]	75	27	49.3	14.65	0.0
Richmond	74	16	46.1	11.36	3.0
Rockport	75	26	51.8	9.49	T.
Rockville †	72	21	45.4	8.95	5.0
Salem	78	24	48.4	7.72	4.0
Scottsburg	75	24	49.4	6.47	4.0
Seymour	74	22	47.1	7.82	2.0
Shelbyville	74	24	46.0	9.50	1.5
South Bend †	71	17	43.0	4.47	1.6
Syracuse †				6.33	T.
Terre Haute †	72	24	45.8	11.03	5.7
Topeka †	68	13	42.1	6.38	T.
Valparaiso †	72	18	41.1	5.33	0.5
Vevay	83	29	50.1	10.43	0.8
Vincennes	75	23	46.2	10.59	T.
Washington †	77			10.17	1.5
Winamac	73	16	43.8	5.00	
Worthington †	75	22	47.6	11.07	4.6
Indian Territory.					
Healdton †	83	19	52.8	5.90	T.
Kemp	85	24	55.0	3.80	
Lehigh †	83	24	52.8	6.72	
Purcell	82	20	52.1	6.49	6.0
South McAlester †				8.15	1.0
Tahlequah	80	19	51.6	12.25	1.0
Tulsa †				5.71	
Wagoner	84	20	49.0	9.91	
Iowa.					
Adair				0.61	4.4
Afton	70	10	39.6	2.07	T.
Albia				2.06	
Algona *[1]	61	6	34.2	1.45	11.0
Alta *a* †	66	5	34.1	1.44	5.1
Amana †	61	15	38.2	2.26	0.7
Ames *b*	67	12	38.3	0.78	T.
Ames (near)				1.13	1.0
Atlantic †	66	9	36.4	2.02	5.0
Audubon	68	10	36.7	1.53	8.0
Belknap	65	15	41.0	2.65	1.0
Belleplaine	60	8	34.2	2.05	2.5
Bonaparte †	64	17	40.2	5.08	1.0
Britt	65	7	33.8	0.93	1.5
Burlington	65	19	42.2	6.13	
Carroll	67	8	35.7	2.01	12.0
Cedarfalls	61	11	37.5	1.34	4.0
Cedar Rapids †	63	14	38.8	1.71	3.5
Chariton	66	14	40.7	1.60	T.
Charles City	60	11	35.8	1.73	2.2
Clarinda †	72	11	40.9	1.73	1.0
Clinton	66	18	39.6	4.73	9.0
College Springs	72	11	39.5	1.35	
Corning †	69	12	39.6	0.80	0.1
Council Bluffs	69	11	39.6	1.17	
Cresco †	59	10	34.4	1.70	5.5
Decorah †	63	8	36.7	2.58	6.5
Delaware *[3]	59	13	35.2	2.12	1.7
Denison †	68	6	36.5	1.35	7.0
Desoto	70	11	38.0	1.59	1.1
Dows	64	8	35.2	1.57	4.0
Eaglegrove *[3]		11	31.9		
Eldora	60	2	35.0	1.75	7.5
Elkader †	65	10	37.3	2.67	3.0
Estherville	64	3	34.0	0.48	2.5
Fairfield †	64	16	39.8	2.82	2.0
Fayette †	58	11	35.8	2.42	6.3
Forest City	65	8	34.4	1.33	
Iowa—Cont'd.					
Fort Madison *† [1]	69	22	44.6	6.21	3.0
Fredericksburg				2.37	
Galva	67	6	36.0	0.82	
Glenwood †	68	10	41.0	1.18	8.0
Grand Meadow *[1]	58	12	35.0	2.35	6.8
Greene	62	10	36.8	1.69	
Greenfield	73	8	38.7	1.70	2.3
Grinnell	61	11	38.6	1.17	
Grundy Center	64	11	36.2	1.20	2.0
Guthrie Center	71	9	37.2	1.31	3.5
Hampton	63	10	35.2	2.37	5.5
Hawkeye				1.34	3.0
Hedrick *[1]	63[f]	19	40.3[e]	1.31	
Hopeville †	67	10	39.0	1.48	
Humboldt †	69	4	35.3	1.74	10.0
Independence †	62	13	36.8	1.71	1.5
Indianola †	66	11	39.4	0.79	0.2
Iowa City *a*	65	17	39.1	3.02	4.0
Iowa Falls †	63	10	35.8	1.14	3.0
Keosauqua	65	17	41.4	5.00	1.0
Knoxville	66	13	40.5	1.22	T.
Lamoni	67	13	40.2	2.37	T.
Lansing	60	6	37.6	2.37	6.6
Larchwood				1.30	2.0
Larrabee †	66	1	34.4	1.09	6.0
Leclaire				5.16	1.5
Lemars	66	6	36.3	1.25	7.0
Lenox	68	10	39.0	1.21	0.7
Logan †	68	7	37.0	1.59	11.0
Maple Valley				1.25	
Maquoketa	65	11	38.6	2.93	4.0
Marshall †	63	12	38.6	0.33	T.
Mason City	62	8	34.0	0.75	
Millman				1.30	
Monticello	60	11	38.5	2.43	5.0
Mooar	67	15	40.6	5.33	
Mountayr †	67	11	39.7	2.15	T.
Mount Pleasant *[1]	62	19	42.2	5.60	
Mount Vernon *a* *[1]	63	16	38.6	2.23	
Mount Vernon *b*	62	15	37.6	1.99	3.5
Neola	67	2	37.9	0.50	1.0
New Hampton	67	11	38.8	1.61	6.0
Newton †	63	12	39.0	1.16	0.8
North McGregor				1.84	3.0
Northwood	62	9	34.6	1.03	3.0
Odebolt	65	6	36.0	2.50	11.0
Ogden	69	9	37.3	2.08	4.5
Olin *	60	10	37.2	2 88	2.0
Osage *[3]		12	32.4	2.01	6.0
Osceola	64	14	38.8	1.26	T.
Oskaloosa †	65	13	39 2	0.87	0.8
Ottumwa	65	15	39.3	1.90	T.
Ovid †	66	12	39.0	2.56	0.8
Plover	65	5	35.8	0.92	5.0
Portsmouth	67	5	35.8	1.68	7.2
Primghar	68	5	35.6	1.20	5.5
Red Oak	69	11	40.0	1.71	T.
Reinbeck				3.68	
Ridgway	60	11	37.4	3.12	7.7
Rock Rapids	64	2	34.2	0.99	4.0
Rockwell City	62	6	34.2	1.18	7 0
Ruthven	63	5	34.4	1.50	7.5
Sac City †	61	6	34 8	1.82	10.5
Sibley	64*	3*	33.3*	0.50	3.0
Sidney	67	12	39.0	2.65	3.6
Sigourney	64	14	39.8	1.85	
Spencer	61	4	33.4	0.74	4.2
Spirit Lake †	65	3	34.5	0.87	5.0
Stuart	69	10	37.7	2.12	5.0
Thurman	68	11	39.6	1.74	6.0
Toledo	63	12	36.9	1.30	0.5
Villisca †	71	11	38.4	1.80	
Vinton *[1]	62	15	37.8	1.41	T.
Washington	65	14	38.4	2.67	1.0
Washta				0.53	1.5
Waterloo	63	12	37.2	1.89	3.5
Waverly	62	13	37.6	1.91	3.2
Webster City	67	10	36.4	2.95	10.0
Westbend *† [1]	63	8	35.4	0.97	4.5
West Branch	61	16	38.0	2.72	0.5
Whitten *[1]	63	11	34.8		
Wilton Junction †	65	16	38.8	3.58	4.0
Winterset †	68	9	37.8	1.51	T.
Kansas.					
Abilene †	78	12	43.0	1.03	T.
Achilles				0.16	1.0
Altoona *† [3]	68	20	42.9	4.32	T.
Anthony				0.64	
Assaria *[5]	74	14	42.4	0.37	0.2
Atchison †	70	15	42.2	3.86	0.2
Augusta	72	16	45.0	1.15	
Beloit †	73	8	43.0	0.78	
Burlington †	74	16	46.0	3.34	T.
Campbell	76	9	41.0	1.68	1.2
Chanute	71[d]	20[g]	45.2[d]	4.63	
Colby †	76	— 1	37.3	0.24	1.0

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Kansas—Cont'd.	°	°	°	*Ins.*	*Ins.*
Columbus	76	22	46.0	5.73	0.8
Coolidge†	80	— 7	40.1	T.	T.
Cunningham†	82	9	42.8	0.54	T.
Delphos	76	8	44.4	1.32	
Ellinwood†	80	8	42.3	0.33	0.1
Emporia	74	17	43.8	2.00	
Englewood†	85	12	44.2	0.66	2.2
Eskridge	72	13	43.2	3.88	T.
Eureka				2.32	T.
Eureka Ranch†	76	3	40.0	0.36	1.4
Fallriver	72	18	46.2	2.98	T.
Fanning	72	15	42.0	3.98	T.
Fort Riley†	79	14	44.7	1.46	T.
Fort Scott†				5.26	T.
Frankfort	77	12	42.7	3.56	1.5
Garden City†	82	7	42.4	0.50	2.0
Garfield				0.48	0.2
Gibson	80	4	39.4	0.16	T.
Gove*†[1]	88	7	38.7	0.27	2.0
Grainfield*[6]	60	8	40.8	0.02	0.2
Grenola	73	16	45.4	2.08	T.
Halstead				1.30	T.
Horton	71	14	42.4	2.76	T.
Hoxie	84	— 1	38.6	0.10	1.0
Hutchinson	78	11	44.6	1.81	T.
Independence	72	20	46.6	3.81	
Lakin†				0.30	3.0
Lebo†	71	16	42.8	4.62	T.
Macksville	80	7	41.3	T.	T.
McPherson	81	11	43.8	1.48	T.
Manhattan *b*	78	15	43.6	1.34	0.2
Manhattan *c*	79	14	42.8	1.40	T.
Marion†	73	15	46.6	1.40	T.
Meade†	83	10	46.2	0.90	1.0
Medicine Lodge†	80	12	44.0	1.03	T.
Minneapolis†	77	10	42.6	1.14	0.5
Morantown†	70	19	43.9	4.73	T.
Morland	80	0	37.8	0.03	0.1
Mounthope*[1]	76	14	44.2	0.48	T.
Ness City	73	12	43.0	0.30	0.2
Newton	74	14	44.6	1.26	T.
Norton	75	5	37.8	0.16	1.0
Norwich	77	15	45.3	0.57	T.
Oberlin				0.40	1.0
Olathe†	70	15	47.2	5.81	
Osage City†	72	14	43.8	2.77	T.
Osborne				0.87	T.
Oswego	75	22	48.8	6.72	0.2
Ottawa	71	15	44.2	3.90	T.
Paola	69			2.22	T.
Phillipsburg	76	3	39.6	0.20	2.0
Pleasant Dale				0.25	T.
Pratt	64	18	40.5	0.30	0.2
Rome*†[1]	74	17	45.6	1.65	T.
Russell	82	3	42.4	0.40	0.5
Salina†	78	10	42.6	0.87	T.
Scott City	84	— 3	38.4	0.14	2.0
Sedan†	82	20	48.0	2.81	
Seneca	76	12	42.3	1.82	1.5
Sharon Springs*[1]	78	2	40.1	0.15	1.5
Toronto	73	15	45.2	2.96	T.
Viroqua†	78	7	44.2	0.40	2.0
Wallace*[1]	68	4	36.2	0.19	1.5
Wamego*[1]	74	14	42.0	1.63	T.
Wellington	72	20	47.0	0.80	T.
Winona				0.45	4.0
Yates Center	72	15	44.4	3.59	T.
Kentucky.					
Alpha				6.01	T.
Ashland	75	29	50.6	3.94	T.
Bardstown†	75	21	49.2	8.23	
Blandville†	77	25	50.3	10.16	
Bowling Green *b*†	77	26	51.6	7.44	T.
Burnside†				4.68	
Caddo	77	25	47.6	9.28	5.0
Canton*†[1]	77	25	53.3	7.21	
Carrollton†	80	26	49.8	9.20	
Catlettsburg*[1]	75	29	47.4	6.93	
Earlington	75	26	50.4	10.01	T.
Edmonton†	76	23	52.0	5.96	T.
Ensor	75	25	51.1	9.36	
Eubank	78	25	50.4	5.76	T.
Falmouth†				6.54	4.0
Fords Ferry	78	26	52.6	7.62	T.
Frankfort	75	21	49.8	8.62	
Georgetown	74	24	49.1		
Greensburg†	78	19	50.3	6.85	T.
Henderson†	79	27	51.5	9.28	T.
Hopkinsville†	79	27	52.0	8.75	T.
Irvington	76	24	51.1	10.30	0.2
Leitchfield†	75	25	50.2	9.27	T.
Loretto	75	16	50.8	8.83	T.
Lyndon				10.33	
Marrowbone†	78	17	51.0	5.47	T.
Maysville	77	26	50.7	5.16	3.2
Middlesboro†	80	20	53.2	3.35	T.
Mount Hermon	75	24	52.4	5.52	T.
Mount Sterling†	73	24	49.0	8.17	5.0
Owensboro†	77	27	52.0	10.21	
Owenton†	73	25	48.4	9.51	6.0
Paducah *a*†				9.92	T.
Paducah *b*†	83	25	51.8	9.49	
Princeton	79	25	50.3	6.75	
Richmond†	74	25	50.9	7.10	T.
Russellville†	80	30	55.3	9.07	T.
St. John†	74	21	48.9	9.36	0.2
Sandyhook				4.31	
Scott	74	27	48.5	7.02	5.5
Shelby City	75	21	49.6	9.24	T.
Shelbyville†	73	22	49.9	9.68	2.5
Southfork[5]			47.7	4.67	
Vanceburg	75	21	46.8	5.34	
Williamsburg†	84	24	54.2	2.75	
Woodburn*[1]	80	22	52.0	7.19	T.
Louisiana.					
Abbeville	85	33	63.4	2.90	
Alexandria†	83	30	60.7	5.73	
Amite†	86	30	63.5	2.23	
Bastrop†	86	28	61.0	3.47	
Baton Rouge†	87	34	63.9	2.69	
Calhoun[1]	86*	28	60.4*	4.03	
Cheneyville†	84	32	59.6	4.35	
Clinton†	86	30	63.3	3.63	
Donaldsonville	88	35	64.8	0.55	
Emilie	81	35	62.8	1.41	
Farmerville	86	28	59.0	2.31	
Franklin†	84	34	64.8	1.23	
Grand Coteau	84	36	64.0	2.46	
Hammond	85	30	63.0	0.63	
Houma	85	35	67.0	1.70	
Jeanerette	85	33	64.8	3.25	
Jennings	83	27	61.2	2.87	
Lafayette	82	34	64.0	1.63	
Lake Charles†	80	34	62.4	3.97	
Lawrence	86	40	67.0	2.08	
Liberty Hill	88	28	60.2	3.81	
Mansfield	87	25	58.6	3.03	
Melville	84	31	62.8	3.40	
Minden	85	29	58.0	3.56	
Monroe†	88	32	61.2	4.11	
Montgomery	84	28	59.6	4.53	
New Iberia	77	37	61.4	1.62	
Opelousas	84	31	63.3	2.90	
Oxford	87	25	59.2	3.36	
Paincourtville†	88	34	65.5	2.97	
Plain Dealing†	87	30	59.0	3.47	
Rayne	83	32	62.6	2.30	
Robeline	86	22	58.9	4.38	
Ruston	86	30	58.8	3.48	
Schriever	86	34	65.6	2.16	
Shellbeach	81	37	63.8	2.32	
Southern University†	80	36	62.4	0.75	
Sugar Ex. Station†	84	38	64.8	2.29	
Sugartown†	81	34	61.4	3.75	
Venice†	81	40	63.4	1.62	
Wallace	85	37	64.8	0.86	
Whitehall	88	32	64.7	0.71	
White Sulphur Springs	85	24	62.5	5.99	
Maine.					
Bar Harbor	65	14	37.0	2.95	15.0
Belfast*[6]	48	21	35.2	2.48	15.0
Calais	50	9	34.8	2.29	16.0
Cornish*[1]	59	16	36.8	1.45	5.0
Cumberland Mills	63	12	37.4	1.15	5.0
Fairfield	52	5	34.9	1.45	9.0
Farmington	55	4	33.3	0.55	2.5
Gardiner	58	11	37.2	1.76	8.0
Indian Stream	52	— 6	28.4	0.96	4.2
Kineo†	56	— 9	31.0	0.82	4.5
Lewiston	58	13	36.9	1.40	5.0
North Bridgton	56	12	36.6	1.11	3.0
Orono	60	5	33.4	2.23	13.0
Petit Menan*[1]	40	24	33.3		
Winslow	55	4	35.1	1.03	4.0
Maryland.					
Annapolis	76	28	50.3		
Bachmans Valley	76	20	45.4	4.75	5.5
Boettcherville	84	16	46.0	6.46	3.5
Charlotte Hall†	81	21	49.0	4.33	
Cherryfields†[2]			47.6	4.47	
Chestertown	79	24	47.8	2.69	T.
Collegepark	77	25	49.4	2.23	
Cumberland *b*	81	28	51.6	5.58	4.0
Darlington†	75	24	47.4	2.69	3.0
Deerpark	75	7	42.3	5.69	4.0
Denton	78	25	48.0	4.68	T.
Easton†	71	24	47.2	3.87	
Ellicott City	78	20	46.5	3.17	4.6
Fallston	74	22	46.4	3.14	4.5
Flintstone	81	14	44.6	4.94	3.5
Frederick	75	26	48.4	3.40	2.5
Grantsville	76	10	42.3	6.98	5.0
Greatfalls	78	19	47.4	2.94	
Greenspring Furnace	82	17	47.0	3.95	4.5
Hagerstown†	82	22	50.1	3.89	4.0
Jewell†	78	23	49.0	3.79	T.
Johns Hopkins Hospital	73	25	46.4	3.03	
Laurel	72	20	46.9		
McDonough[4]	75	24	48.4		
Mardela Springs†	77	22	48.6	3.82	
Mount St. Marys Coll.†	74	26	45.8	3.68	7.5
New Market	79	21	47.0	3.29	3.0
Port Deposit	72	22	45.9	3.55	
Princess Anne	75	23	49.7	4.05	
Sharpsburg	78	21	46.6	3.37	1.8
Solomons†	75	27	48.5	4.24	
Sunnyside	75	9	43.8	8.34	5.0
Taneytown†	80	22	48.0	3.73	4.5
Van Bibber	72	24	45.6	3.43	4.0
Westernport	81	20	44.8	4.93	3.2
Westminster	82	28	48.9	4.06	5.0
Woodstock	78	22	47.0	2.48	3.4
Massachusetts.					
Adams	60	10	39.2		
Amherst	62	14	40.3	1.18	1.0
Attleboro				2.47	
Bedford	64	18	39.6	1.96	4.0
Bluehill (summit)	63	22	40.7	2.72	13.0
Cambridge *a*	65	22	41.8	2.03	
Chestnut Hill	66	19	41.6	2.20	6.0
Clinton	63	14	40.6		
Cohasset				3.48	9.0
Concord	65	17	40.0	1.87	7.2
Dudley[1]	65*	21	40.6	2.37	5.0
East Templeton*[1]	57	15	38.0	1.04	6.0
Fallriver	61	24	42.2	3.07	12.0
Fiskdale				3.35	13.0
Fitchburg *a*[1]	60	20	39.2	1.60	8.0
Fitchburg *b*	62	17	40.6	1.37	7.5
Framingham	65	19	42.3	2.40	
Groton	60	15	39.0	1.83	8.5
Hyannis*†[1]	60	24	39.6	3.74	6 5
Jefferson				2.59	15.0
Lawrence	64	18	40.5	1.41	4.0
Leeds	59	13	38.7	2.44	T.
Leicester Hill	62	17	39.6		
Leominster				1.26	9.5
Long Plain				3.75	
Lowell *a*	65	18	40.8	1.65	
Lowell *b*	64	17	40.0		
Lowell *c*	69	21	42.4		
Ludlow	60	11	35.6	2.22	0.5
Lynn *a*	62	24	40.5	2.01	
Mansfield*[1]	62	15	39.0	3.35	10.5
Middleboro	62	17	40.0	2.90	7.5
Monson	65	17	41.7	2.85	6.0
Mount Nonotuck				2.00	4.5
New Bedford *a*	59	26	41.0	3.50	3.0
New Bedford *b*	60	21	40.3	3.52	3.5
New Salem	59	16	39.0	1.30	5.5
Pittsfield	55	9	37.5	2.35	2.5
Plymouth	66	26	42.6	2.27	5.5
Princeton				2.27	13.5
Provincetown	61	19	40.8	2.12	3.5
Salem				1.98	8.0
Somerset*[1]	67	22	42.1	3.35	6.5
South Clinton				2.34	9.8
Springfield Armory	62	15	40.0	1.00	0.8
Sterling				1.88	7.5
Taunton *b*	62	21	40.2	2.80	9.5
Taunton *c*	61	16	40.0	3.06	
Turners Falls	58	15	38.5	1.30	
Webster				2.70	6.5
Westboro†	66	18	41.8	2.32	8.0
Weston	64	19	40.5	1.99	7.8
Williamstown	57	9	37.7	2.47	2.0
Winchendon				1.20	2.5
Worcester *b*	62	22	42.1	2.37	6.0
Michigan.					
Adrian	70	7	39.8	4.78	0.5
Agricultural College	69	4	37.0	3.59	T.
Allegan	70	5	38.4	4.24	0.0
Alma	66	2	36.2	4.00	T.
Ann Arbor	70	10	39.0	2.95	0.5
Arbela	68	7	36.2	3.84	0.0
Baldwin	61	— 9	33.7	3.92	3.2
Ball Mountain	66	7	37.1	2.39	0.3
Battlecreek	66	10	38.9	4.21	0.1
Bay City *b*	62	11	35.4	3.52	0.0
Benton Harbor	67	14	40.2	4.31	0.5
Berlin	67	6	36.3	2.79	0.0
Berrien Springs	72	12	40.0	4.98	0.5
Big Rapids	60	0	34.8	3.78	0.0
Birmingham	68	10	37.7	3.30	
Boon	58	1	32.0	4.94	5.4
Calumet	54	12	29.7	1.32	12.0
Carsonville	63	1	35.0	2.39	0.0
Charlevoix	58	1	32.2	2.67	2.0

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Michigan—Cont'd.	°	°	°	*Ins.*	*Ins.*
Cheboygan	60	1	32.5	2.26	2.2
Clinton	70	7	39.4	3.40	T.
Coldwater	70	10	40.2	5.51	0.0
Crisps *[1]	54	11	31.2	.....	.....
East Tawas	54	7	32.8	2.52	.....
Eloise	70	7	39.6	3.35	0.0
Escanaba†	54	— 2	29.8	2.80	10.5
Ewen	.....	.....	.....	0.42	4.2
Fairview	67	11	37.6	3.19	0.8
Fitchburg	69	3	37.4	4.47	T.
Flint	78	0	36.7	3.37	0.0
Frankfort	52	5	34.5	.....	.....
Gladwin	60	— 3	33.9	3.75	0.0
Grand Rapids *b*	67	9	35.7	2.91	0.0
Grape	70	10	40.2	4.58	1.0
Grayling	58	1	31.4	1.67	3.0
Hanover	70	1	38.2	3.57	0.5
Harrisville	55	6	32.6	2.95	2.7
Hart	61	12	35.7	3.36	2.0
Hastings	69	1	37.2	3.21	T.
Hayes	62	2	36.3	2.36	.....
Hillsdale	70	10	39.0	4.97	1.0
Howell	68	6	41.5	6.68	T.
Humboldt	52	—19	25.4	0.81	3.0
Ionia	66	1	36.6	2.46	T.
Iron River	56°	— 9°	26.0°	2.27	15.7
Ivan	57	7	33.6	3.08	4.5
Jackson	70	13	39.6	3.62	.....
Jeddo	66	6	36.4	3.07	0.0
Kalamazoo	69	8	39.0	2.32	T.
Lake City	59	3	32.1	2.01	0.5
Lansing	69	9	37.1	3.22	0.2
Lapeer	66	— 2	35.3	2.33	0.0
Lathrop	54	— 8	28.0	2.85	21.5
Ludington	58	12	35.0	2.79	2.2
Luzerne	59	3	31.9	2.81	0.5
Mackinaw City	58	0	32.0	3.51	6.0
Madison	68	8	40.0	4.20	0.4
Mancelona	59	0	32.6	2.94	3.5
Manistee	61	4	34.9	3.38	5.0
Middle Island *[10]	52	17	35.2	.....	.....
Midland	63	6	34.2	.....	.....
Mottville	72	10	41.0	3.75	T.
Mount Clemens	70	5	37.2	3.24	0.0
Mount Pleasant *b*	63	— 1	32.4	1.94	T.
Muskegon	60	6	35.2	1.35	0.5
Newberry	52	— 5	27.6	2.50	12.0
North Manitou Island *[10]	52	22	34.1	.....	.....
North Marshall	69	1	36.5	3.83	.....
Northport	57	8	35.7	2.00	10.0
Old Mission	59	15	35.9	3.10	.....
Olivet	67	10	38.8	6.16	T.
Omer	62	— 6	32.2	2.26	.....
Ovid	67	5	37.0	3.31	0.0
Owosso	69	7	38.2	3.80	.....
Parkville	.....	.....	.....	5.30	T.
Petoskey	62	8	33.4	2.75	4.5
Plymouth	68	7	37.7	3.17	T.
Port Austin	64	3	34.6	2.56	0.0
Reed City	60	— 2	33.2	1.88	.....
Rockland	60	4	29.8	1.84	8.0
Rogers City	60	— 2	32.0	2.12	3.0
Romeo	66	8	38.2	3.29	0.0
Saginaw	66	9	40.2	3.35	0.0
St. Ignace	56	5	31.2	2.62	12.5
St. Johns	65°	9°	37.8°	2.92	0.0
Sandbeach *a*	65	2	33.3	1.85	0.0
Sidnaw	58	3	28.9	0.80	8.0
Somerset	68	9	38.2	4.20	0.5
Thomaston	52	8	28.2	1.57	7.0
Thornville	66	4	38.4	2.94	0.0
Thunder Bay Island *[10]	44	19	32.4	.....	.....
Traverse City	62	6	33.9	2.06	4.0
Valley Center	66	— 1	34.6	2.84	T.
Vandalia	72	8	40.8	4.21	0.2
Vassar	65	— 1	36.0	2.79	T.
Vermillion Point *[10]	50	0	27.3	.....	.....
Wasepi	70	10	39.1	4.51	0.0
Waverly	65	3	36.5	3.86	0.3
West Harrisville	56	— 3	32.4	2.18	T.
Wetmore	54	— 6	28.7	2.79	24.0
White Cloud	.....	3	.....	3.89	0.8
Ypsilanti	67	7	37.6	3.45	1.2
Minnesota.					
Ada†	57	—10	25.9	0.57	9.5
Albert Lea	58	6	32.9	2.00	6.5
Alexandria†	63	— 3	29.2	1.59	10.3
Beardsley	67	—17	29.4	1.23	5.3
Bingham Lake	62	3	31.3	.....	.....
Bird Island	61	5	32.4	1.12	11.2
Blooming Prairie†	67	6	33.1	1.02	3.7
Caledonia†	59	8	34.9	2.27	6.3
Camden	62	— 1	31.4	0.68	6.0
Collegeville	57	5	32.8	0.54	5.1
Crookston†	50	— 6	24.8	1.15	5.0
Deephaven	.....	.....	.....	2.19	14.6

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Minnesota—Cont'd.	°	°	°	*Ins.*	*Ins.*
Detroit City	58	— 8	24.0	0.55	2.0
Faribault	62	8	33.4	1.21	7.5
Farmington†	61	8	33.0	1.45	11.0
Fergus Falls†	60	— 4	28.0	0.75	6.3
Glencoe	60	—12	28.6	.....	.....
Glenwood	64	0	30.2	0.92	.....
Grand Meadow†	60	7	32.4	1.95	4.0
Koochicking	55	— 9	23.4	0.77	.....
Lake City	62	5	35.5	1.19	2.0
Lake Jennie	55	7	32.0	1.36	15.0
Lakeside†	60	6	31.8	2.77	7.5
Lake Winnibigoshish	55	— 9	24.6	1.19	12.0
Lambert†	51	—11	23.3	1.40	4.0
Leech Lake	59	—10	26.2	1.45	11.5
Long Prairie	56	— 8	28.3	0.94	5.0
Lutsen	44°	— 1°	26.4°	1.73	.....
Luverne†	54	1	28.9	1.15	2.0
Lynd	63	— 2	29.6	0.44	.....
Mapleplain	60	.....	.....	2.97	18.8
Maplewood *[1]	58	10	34.6	.....	11.5
Milaca	59	2	29.8	0.20	2.0
Milan†	64	— 4	30.0	1.02	10.5
Minneapolis *a*	60	7	33.6	1.65	13.1
Minneapolis *b*[1]	60°	5	31.9	1.68	13.7
Minnesota City *†[1]	62	10	36.0	1.64	5.5
Montevideo†	64	1	31.0	1.21	6.8
Morris	64	— 2	29.4	0.81	6.6
Mount Iron	60	—14	21.2	0.40	4.0
Newfolden	46	—10	20.6	.....	.....
New London	57	2	30.6	0.30	3.0
New Richland *[1]	58	10	31.5	.....	.....
New Ulm†	62	9	33.1	1.16	6.5
Park Rapids†	56	— 8	26.3	1.51	10.7
Pine River	54	— 7	27.8	0.95	4.8
Pleasant Mounds	63	6	34.0	1.45	6.2
Pokegama Falls	56	—17	25.4	1.14	9.1
Redwing	.....	.. ..	.....	3.22	5.2
Reeds	.....	.....	.....	1.31	.....
Rolling Green	57	8	31.8	0.70	8.0
Roseau [1]	48	—10	19.0	1.03	7.6
St. Charles†	59	5	35.8	1.69	4.2
St. Cloud	54	5	29.5	1.75	13.0
St. Olaf	61	— 3	27.6	0.77	9.0
St. Peter	60	10	36.6	0.70	7.0
Sandy Lake Dam	53	— 8	27.4	0.69	7.0
Sauk Center	54	0	27.0	1.20	7.5
Shakopee [6]	58*	11	34.0	1.17	10.8
Tower†	56	—18	21.4	1.45	14.5
Two Harbors	58	0	30.3	1.41	7.5
Wabasha *[1]	62	6	35.0	1.35	6.0
Willow River	61	— 9	31.0	0.81	5.3
Worthington	60	— 4	31.4	0.83	6.8
Zumbrota [1]	60*	6	35.0	.....	.....
Mississippi.					
Agricultural College	82	30	58.0	4.95	
Austin†	90	26	58.5	4.03	
Batesville†	82	27	57.3	3.64	
Bay St. Louis	85	37	64.0	2.56	
Biloxi†	82	32	64.0	1.69	
Booneville	81	28	56.6	4.50	
Briers	82	32	60.0	4.34	
Brookhaven†	88	28	62.1	3.37	
Canton†	84	32	61.4	5.00	
Columbus *a*	.....	.....	.....	6.35	
Corinth	82	29	56.8	6.02	
Crystal Springs†	85	30	60.1	5.86	
Edwards	86	32	60.7	5.01	
Fayette	.....	.....	.....	5.12	
French Camps	83	22	57.7	4.16	
Greenville *a*	84	32	57.8	3.13	
Greenville *b*†	90	32	59.7	2.94	
Greenwood [1]	85	38	62.7	3.78	
Hattiesburg†	84	32	63.2	1.18	
Holly Springs†	81	28	54.8	5.37	
Jackson†	85	30	58.8	6.87	
Kosciusko	83	28	59.0	5.17	
Lake†	89	36	60.8	5.38	
Leakesville	87	29	63.8	1.08	
Logtown†	84	35	65.6	0.62	
Louisville†	84	30	59.4	4.56	
Macon†	86	29	58.8	3.96	
Magnolia†	85	29	61.8	3.30	
Moss Point	82	38	64.8	0.15	
Natchez†	87	33	62.0	5.25	
Okolona†	87	30	57.8	2.75	
Palo Alto	85	31	60.0	3.34	
Pontotoc	85	24	57.2	3.74	
Port Gibson†	88	29	61.0	6.39	
Rosedale	88	29	58.0	4.52	
Stonington *[1]	84	32	59.0	.....	
Thornton	84	36	61.2	2.56	
Tupelo†	.....	.....	.....	3.66	
Walnut Grove	85	33	62.5	6.04	
Water Valley *†[1]	83	28	57.6	3.62	
Woodville†	83	31	62.0	5.71	
Yazoo City†	88	32	60.8	3.97	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Missouri.	°	°	°	*Ins.*	*Ins.*
Arlington	.....	.....	.....	7.77	2.0
Arthur *[3]	.. ..	33	43.8	5.74	
Avalon	68[f]	12°	37.4°	5.56	
Bagnell	.....	.....	.....	6.06	
Bethany	67	15	41.4	3.55	
Birchtree	78	17	45.6	14.67	1.0
Bolckow	.....	.....	.....	1.63	T.
Boonville†	.....	.....	.....	3.34	T.
Brunswick	69	18	43.0	5.89	
Carrollton†	68	19	44.5	5.53	T.
Conception	67	13	41.5	1.67	1.0
Cowgill *[5]	66	12	41.0	6.27	T.
Darksville†	68	18	41.3	6.50	
Downing	.....	.....	.....	5.25	T.
East Lynne *[3]	.....	20	42.7	5.42	T.
Edgehill *[5]	68	18	45.0	12.72	T.
Eightmile *[1]	68	19	44.0	4.84	T.
Eldon	76	19	45.4	7.62	T.
Elmira	69°	11°	41.4°	5.23	T.
Fairport	.....	.....	.....	2.97	T.
Farmersville	.....	.....	.....	5.32	
Fayette	72	20	46.3	3.77	0.5
Fulton	.....	.....	.....	7.11	T.
Gallatin *[1]	68	17	42.2	5.25	T.
Glasgow	69	18	44.1	7.59	.....
Gordonville *[3]	.....	22	46.0	12.70	T.
Gorin	.....	.....	.....	5.26	
Halfway	74	18	47.0	5.99	T.
Harrisonville†	70	18	43.2	4.54	T.
Hermann†	.....	.....	.....	6.11	.....
Houston	77	11	48.4	10.71	T.
Houstonia	.....	.....	.....	4.04	2.0
Irena	.....	.....	.....	2.41	0.2
Ironton†	77	18	46.3	11.60	T.
Jefferson City†	75	17	45.6	6.37	
Kidder	67	15	41.7	5.10	0.3
Lamar†	75	22	46.8	5.81	T.
Lamonte	.....	.....	.....	4.60	T.
Lebanon	73	18	46.7	7.53	2.0
Lexington	69	17	44.5	4.01	
Liberty	70	16	43.4	6.18	T.
Louisiana	73	20	44.9	4.91	T.
McCune *†[1]	68	23	43.4	5.35	1.0
Malden [f]	83	25	56.0	8.31	T.
Mansfield	.....	.....	.....	13.75	5.5
Marblehill	76	21	47.5	12.68	
Marshall†	70	18	43.6	6.45	T.
Maryville	68	12	37.8	1.76	T.
Mexico†	70	20	44.8	4.99	1.0
Mineralspring	75	15	46.0	10.72	2.0
Montreal	73	16	45.1	5.81	0.5
Mount Vernon	76	17	47.7	8.04	2.0
Neosho	76	16	47.8	7.46	1.0
Nevada	80	20	45.8	6.39	T.
New Haven *[1]	72	26	48.2	7.04	1.0
New Madrid	75	29	52.0	9.82	
New Palestine	82	20	49.2	3.96	T.
Oakfield	73	23	46.8	8.34	3.0
Oakmound	.....	.....	.....	14.12	
Olden†	79	16	47.4	15.24	1.5
Oregon *a*	70	14	41.8	2.75	0.8
Oregon *b*	72	15	43.4	2.90	0.2
Osceola†	.....	.....	.....	4.45	
Oto	.....	.....	.....	10.30	0.5
Palmyra *[5]	68	20	44.8	6.48	
Phillipsburg *†[1]	72	16	44.8	7.88	4.5
Pickering *[3]	72	16	40.1	2.70	0.8
Platte River *[3]	68	16	39.7	4.08	T.
Poplar Bluff	81	25	51.4	12.81	
Potosi	74	9	40.6	11.61	T.
Princeton	66	14	41.9	3.44	T.
Rhineland	73	17	46.6	5.96	T.
Richmond	67	16	42.7	4.53	T.
Rolla	.....	.....	.....	8.94	2.5
St. Charles	73	24	46.6	8.79	0.8
St. Joseph	.....	.....	.....	3.34	T.
Sarcoxie *[3]	.....	18	42.5	6.49	0.2
Sedalia	72	16	42.6	4.32	
Seymour	74	19	45.2	11.27	5.5
Shelbina	.....	.. ..	.....	7.20	
Sikeston	82	25	50.8	11.88	
Steffenville	68	18	42.4	8.43	1.0
Stellada†	71	19	44.0	4.82	T.
Sublett	66	14	39.6	11.30	T.
Vichy	73	15	45.2	7.21	2.5
Virgil City	.....	.....	.....	5.13	T.
Warrenton	78	21	44.2	6.65	T.
Wheatland	.....	.....	.....	4.84	T.
Willow Springs	78	16	45.4	15.48	T.
Zeitonia	80	18	49.4	11.01	T.
Montana.					
Bigtimber	60	—23	29.4	1.71	19.5
Billings	68	—20	27.2	2.20	22.0
Boulder	53	—20	22.2	.....	.....
Bozeman†	54	—16	26.1	1.62	16.2
Butte	53	—19	22.2	1.56	15.6

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Montana—Cont'd.	°	°	°	*Ins.*	*Ins.*
Castle	48	−23	21.4	0.90	9.0
Chinook†	50	−18	18.8	1.45	14.5
Choteau	68	−21	20.5	3.60	36.0
Columbia Falls	52	−14	28.2	3.29	25.5
Dearborn Canyon	52	−28	20.9	4.60	46.0
Deer Lodge	50	−15	25.2	1.81	17.0
Dupuyer	52	−20	19.8	3.90	39.0
Fort Benton	58	−18	24 0	1.40	14.0
Fort Keogh†	60	−14	23.4	1.10	.....
Fort Logan	68	−32	22.8	1.68	.....
Fort Missoula	60	1	31.6	0.66	5.2
Glasgow	53	−27	17.3	3.50	....
Glendive†	65	−13	22.2	2.10	21.0
Glenwood	54	−22	24.0	1.86	18.5
Greatfalls†	60	−15	27.6	1.14	11.4
Kalispell	55	−16	30.8	3.12	30.2
Kipp†	51	−26	18.0	4.48	45.5
Lewistown	53	−19	24.2	3.16	28.5
Livingston†	59	−15	27.3	1.20	17.0
Manhattan†	59	−23	25.9	0.42	4.2
Martinsdale†	55	−18	23.6	1.30	13.0
Marysville†	52	−13	21.2	2.13	31.0
Parrot	60	−16	26.5	0.73	9.9
Poplar	57	−22	15.8	2.91	29.2
Radersburg	56	− 5	28.4	0.58	5.8
Redlodge	48	−21	20.0	2.62	26.2
St. Ignatius Mission	58	−10	32.4	1.88	16.0
St. Pauls†	60	−17	21.0	0.30	3.0
Troy	56	− 3	33.8	1.75	4.0
Utica	54	−18	23.2	1.91	19.0
Virginia City†	52	−15	23.4	2.08	21.0
Wibaux	64	−20	23.3	1.50	15.0
Yale	59	−10	23.8	1.55	15.5
Nebraska.					
Agee*[1]	70	− 2	32.2	0.41	T.
Albion	69	2	36.3	0.20	.....
Alliance	.....	.....	.....	0.30	3.0
Alma*[1]	80	0	37.7	0.17	1.7
Ansley†	76	− 2	36.1	0.10	1.0
Arapaho*[1]	72	0	36.1	T.	T.
Arborville*[1]	70	0	34.6	0.63	5.0
Ashland *a*†	71	4	39.8	1.51	9.5
Ashland *b**[1]	68	15	39.1	1.10	4.5
Ashton	72	0	36.0	0.19	1.0
Auburn*†[1]	72	12	40.6	1.77	1.0
Aurora*[1]	72	10	37.1	0.74	3.5
Beatrice†	74	8	38.3	1.88	3.0
Beaver City†	80	1	39.7	0.16	1.0
Benedict	.....	.....	.....	0.95	7.0
Benkelman	.....	.....	.....	0.40	2.5
Blair	67	8	36.7	1.29	7.2
Bluehill	.....	.....	.....	0.08	1.0
Brokenbow	.....	.....	.....	0.00	
Burchard	.....	.....	.....	2.25	.....
Burwell	.....	.....	.....	T.	T.
Callaway†	74	0	34.8	0.60	6.0
Camp Clarke	71	− 3	33.4	0.75	7.5
Central City	.....	.....	.....	0.22	2.2
Chester*[1]	76	12	39.8	0.57	4.2
Cody	.....	.....	.....	0.80	8.0
Columbus†	70	5	37.0	0.82	5.0
Cornlea	.....	.....	.....	0.77	.....
Creighton†	68	1	34.4	1.13	4.0
Crete	73	5	39.5	0.40	4.0
Culbertson	.....	.....	.....	0.24	2.5
Curtis *a*	81	3	40.2	0.25	3.0
David City	67	5	35.8	0.75	7.0
Dawson	74	13	42.2	2.02	0.8
Divide	.....	.....	.....	0.22	1.5
Dunning*[1]	62	1	34.2	0.26	2.0
Eden	.....	.....	.....	1.69	1.0
Edgar*[1]	70	6	36.2	.....	.....
Elba	.....	.....	.....	0.31	2.0
Ericson*†[1]	69	− 1	32.5	0.20	2.0
Ewing†	.....	.....	.....	1.18	6.2
Fairbury†	76	1	39.8	1.30	2.0
Fairfield	72	10	45.0	0.36	3.5
Fairmont†	72	5	37.9	0.30	3.0
Fort Robinson	62	− 6	28.8	1.30	13.0
Franklin	82	11	40.4	0.05	0.5
Fremont†	68	5	37.6	1.75	9.0
Geneva†	71	6	37.2	0.25	1.9
Genoa	68	5	37.0	0.82	3.4
Gering	63	−14	24.3	0.30	3.0
Gordon	.....	.....	.....	0.10	.....
Gothenburg	77	0	37.2	0.50	5.0
Grand Island *a**[1]	77	4	40.8	1.18	2.8
Grand Island *b*	70	5	37.0	0.77	3.6
Greeley*[1]	70	− 2	33.0	0.20	2.0
Haigler	.....	.....	.....	0.70	3.0
Hartington†	67	3	33.7	1.23	5.5
Harvard	68	5	37.2	0.40	2.5
Hastings*[1]	67	5	37.7	0.25	2.5
Hayes Center	.....	.....	.....	0.40	4.0
Hay Springs	65	− 9	29.6	0.88	5.6
Hebron†	74	8	39.3	0.88	4.0
Hickman	.....	.....	.....	1.85	4.5
Holdrege *b**[1]	71	10	34.5	0.63	0.3
Hooper*[1]	66	8	35.9	1.51	5.5
Imperial†	75	− 1	36.2	0.56	2.5
Indianola (near)*[1]	72	2	36.8	0.25	2.5
Johnstown	.....	.....	.....	0.33	2.0
Kearney	.....	.....	.....	0.04	0.2
Kennedy	73	− 5	33.2	0.64	4.5
Kimball†	68	− 6	31.2	0.75	7.5
Kirkwood*[1]	75	− 1	31.6	0.72	5.2
Lexington†	76	1	37.1	0.10	.....
Lincoln *b*	73	9	39.2	1.59	10.8
Lincoln *d*†	74	9	40.2	1.55	10.3
Lodgepole†	72	− 5	32.4	0.10	1.0
Loup *b**[1]	74	2	36.1	0.03	T.
Lynch*†[1]	76	2	32.1	0.52	2.8
Lyons	.....	.....	.....	1.24	3.0
McCook*[1]	76	4	40.9	0.20	2.0
McCool	.....	.....	.....	0.70	.....
Madison	66	1	35.6	0.86	4.0
Madrid*[5]	78	0	31.4	0.30	3.0
Marquette	.....	.....	.....	0.50	4.5
Merriman	.....	.....	.....	0.20	1.0
Minden *a*	72	4	37.5	0.32	2.2
Minden *b*	.....	.....	.....	0.23	.....
Monroe	.....	.....	.....	0.47	.....
Nebraska City *b*	.....	.....	.....	1.50	3.0
Nebraska City *c*	72	8	38.5	1.15	.....
Nemaha*[1]	71	12	39.2	1.61	T.
Nesbit	71	− 4	33.8	0.30	2.0
Norfolk *b*	67	2	36.6	0.72	3.0
Norman	.....	.....	.....	0.63	3.0
North Loup	74	1	36.5	0.20	2.0
Oakdale†	69	1	34.7	0.69	1.9
Odell*[5]	70	10	39.3	2.11	2.0
O'Neill†	74	− 2	32.7	0.75	3.5
Ord	74	0	35.6	0.22	2.0
Osceola	.....	.....	.....	1.00	2.0
Ough†	.....	.....	.....	0.45	3.0
Palmer *b*	.....	.....	.....	0.85	1.0
Plattsmouth *a*	.....	.....	.....	1.30	4.0
Plattsmouth *b**[1]	69	18	38.9	.....	.....
Ravenna *a*	76	3	37.2	0.23	1.8
Redcloud *a*	.....	.....	.....	0.27	2.8
Redcloud *b**[1]	70	6	40.4	0.25	2.5
Republican*[1]	72	4	44.5	0.08	0.8
Rulo*[1]	68	18	41.4	2.10	T.
St. Libory	74	4	37.7	0.65	2.2
St. Paul	68	4	38.6	0.54	2.0
Salem*[1]	70	14	40.5	0.80	T.
Santee Agency†	72	1	35.7	0.60	4.5
Schuyler	.....	.....	.....	0.73	3.0
Seneca*[1]	70	− 4	33.4	0.10	1.0
Seward*[1]	68	9	37.8	0.60	4.0
Springview	67	− 1	31.8	0.32	3.2
Stanton*[1]	65	5	34.4	0.75	3.5
Stockham	.....	.....	.....	0.50	2.8
Strang*[1]	70	8	38.7	0.60	2.0
Stratton	.....	.....	.....	0.24	.....
Superior*[5]	70	8	39.0	0.55	2.0
Syracuse	.....	.....	.....	1.72	4.0
Tablerock	78	12	40.8	2.05	0.1
Tecumseh *b*†	64	12	40.5	1.55	.....
Tekamah	68	5	37.1	2.10	10.0
Thedford*[1]	72	− 4	32.0	0.35	3.5
Turlington†	66	6	34.0	1.32	5.0
Valentine†	68	− 4	32.5	0.57	.....
Valparaiso	.....	.....	.....	0.85	3.5
Wakefield	65	4	36.2	1.22	5.0
Wallace	.....	.....	.....	0.30	3.0
Weeping Water*[1]	65	0	35.6	1.36	6.5
Westpoint†	65	6	37.0	1.07	.....
Whitman	.....	.....	.....	0.20	2.0
Wilber*[1]	68	12	42.6	1.10	4.5
Willard	.....	.....	.....	0.07	.....
Wilsonville*[1]	74	2	38.0	T.	0.0
Wisner*[5]	75[4]	6[4]	36.0[4]	1.81	6.0
Wymore*[1]	61	14	40.3	1.95	0.5
York*[1]	68	− 8	37.0	0.75	7.5
Nevada.					
Austin	56	3	30.4	1.43	16.0
Battle Mountain*[1]	62	8	33.9	0.55	6.0
Beowawe*[1]	68	10	34.1	0.53	6.0
Blaine	59	− 9	30.5	0.97	10.5
Bunkerville	.....	.....	.....	T.	T.
Candelaria	72	9	37.8	0.17	2.0
Carlin*[1]	73	5	35.6	0.47	5.0
Carson City	67	9	36.4	1.00	13.2
Cranes Ranch	.....	.....	.....	0.58	5.3
Elko*[5]	58	22	39.9	.....	.....
Elko (near)	54	− 4	30.8	0.55	6.0
Ely	57	− 1	29.9	2.01	20.5
Empire Ranch	55	0	30.5	0.83	9.5
Fenelon*[1]	55	0	27.0	1.41	15.5
Golconda*[1]	62	12	35.5	0.27	3.0
Halleck*[1]	56	9	28.9	0.35	4.0
Hawthorne *a**[5]	62	18	39.8	0.39	3.5
Hawthorne *b*	66	13	39.3	0.38	3.5
Hot Springs	.....	.....	.....	T.	T.
Humboldt*[1]	65	14	37.7	0.23	2.5
Keysers Springs*[1]	68	12	37.6	0.21	1.5
Lewers Ranch	66	6	35.7	1.57	18.8
Los Vegas	70	20	45.8	T.	
Lovelock*[1]	64	19	37.7	0.15	0.8
McGill	60	− 4	30.5	0.64	7.6
Martinis	64	10	37.5	0.56	5.9
Midas	57	0	31.2	1.14	17.2
Mill City*[1]	65	10	34.4	0.27	3.0
Monitor Mill	57	− 1	28.4	1.30	18.5
Osceola	62	7	34.6	1.37	15.0
Palisade*[1]	67	− 1	37.3	0.46	5.0
Palmetto	65	1	31.8	0.80	7.0
Panaca	72	9	39.3	1.05	8.5
Reno State University	64	10	36.3	0.65	5.8
Ruby Valley	.....	.....	.....	0.88	9.8
St. Clair	65	9	37.2	0.25	4.0
St. Thomas	79	19	48.8	T.	
San Antonio	67	5	34.8	T.	T.
Silverpeak	70	13	41.6	0.73	4.0
Sodaville	69	8	38.2	0.21	1.5
Tecoma*[1]	60	20	34.6	0.22	2.5
Toano*[1]	60	8	31.6	0.72	8.0
Tuscarora	67	− 7	27.0	0.84	5.2
Tybo	60	18	36.4	0.47	7.0
Verdi*[1]	74	8	33.5	0.24	2.8
Wadsworth	.....	.....	.....	0.60	6.5
Wells	59	−10	29.1	1.02	.....
New Hampshire.					
Alstead*[5]	54	10	36.7	0.84	2.0
Berlin Mills	67	−10	32.8	0.84	1.0
Bethlehem	61	8	35.4	1.44	1.5
Brookline*[1]	62	12	38.2	1.51	7.5
Claremont	58	10	37.1	1.05	5.0
Concord	62	8	37.4	0.84	2.9
Durham	64	17	38.0	1.79	8.5
Grafton†	64	2	35.2	0.79	T.
Hanover	59	2	36.2	1.17	1.2
Keene	61	6	37.6	0.97	2.0
Lancaster	58	−10	31.4	1.97	1.2
Littleton	65	8	37.4	1.39	1.0
Nashua	64	12	39.1	1.47	11.0
Newton	63	12	38.3	1.15	3.0
North Conway	63	− 9	36.1	0.30	T.
Peterboro	58	5	36.8	0.57	T.
Plymouth	55	5	34.0	1.26	1.5
Sanbornton†	57	9	36.0	0.79	T.
Stratford	63	− 5	35.0	1.50	2.0
Warner	.....	.....	.....	1.11	2.0
New Jersey.					
Asbury Park	77	23	43.6	4.12	1.5
Barnegat	67	24	45.2	3.54	
Bayonne	74	24	45.0	3.18	4.8
Belvidere	71	20	44.8	2.94	5.0
Beverly†	74	21	47.2	3.54	3.5
Billingsport*[1]	68	25	45.8	3.78	1.5
Boonton	73	20	43.8	3.08	0.5
Bridgeton	76	25	48.8	3.46	T.
Camden	72	23	47.2	3.36	2.5
Cape May C. H.†	75	20	45.3	3.02	
Charlotteburg	73	17	42.6	3.48	3.0
Chester	69	19	42.8	2.56	10.0
Clayton	70[f]	22[f]	46.2[f]	2.56	1.0
College Farm†	72	22	45.3	3.22	4.0
Deckertown	69	19	44.5	3.17	2.0
Dover	74	20	43.0	3.06	6.8
Egg Harbor City	76	19	45.0	3.96	T.
Elizabeth†	75	23	44.7	4.19	
Englewood	71	13	42.6	3.10	2.0
Flemington	74	21	46.4	3.01	2.0
Franklin Furnace	68	16	43.2	2.62	T.
Freehold	76	22	45.3	3.93	T.
Friesburg	77	22	47.6	2.79	1.5
Gillette	71	19	43.4	3.20	7.0
Hammonton	.....	.....	.....	3.41	.....
Hanover	70	22	44.6	3.50	5.5
Hightstown	73	22	46.9	3.72	3.5
Imlaystown	73	22	47.2	4.88	3.0
Junction	.....	.....	.....	3.73	7.8
Lambertville	73	23	45.8	3.45	0.5
Moorestown	74	21	47.4	3.40	2.0
Newark *b*†	72	24	45.5	3.65	2.3
New Brunswick *a*	75	22	47.1	3.22	2.1
Newton	70	20	44.4	.....	.....
Ocean City	70	22	44.5	3.26	
Oceanic	72	24	43.8	3.79	2.8
Paterson	75	24	46.4	3.47	6.5
Perth Amboy	73	23	43.7	3.73	1.0
Plainfield	72	21	43.8	3.66	5.6
Port Norris	70	28	47.4	2.76	
Rancocas	.....	.....	.....	3.25	2.5
Rivervale	72	17	42.8	2.59	7.0
Roseland	72	18	43.1	3.65	5.8

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
New Jersey—Cont'd.	°	°	°	*Ins.*	*Ins.*
Somerville	75	21	45.8	3.23	3.3
South Orange	71	24	44.3	3.95	7.0
Staffordville	.....	.....	.....	4.25	T.
Toms River	79[g]	15	45.0	3.88	.....
Trenton	70	25	47.8	3.06	T.
Vineland	77	21	47.5	3.11	1.0
Woodbine	71	19	46.6	3.90	
New Mexico.					
Albert	73	11	48.4	0.07	T.
Alma	75	16	45.0	0.83	
Albuquerque†	66	21	45.8	0.34	
Aztec†	62	10	36.4	0.73	T.
Bernalillo†	73	21	45.9	0.37	
Bluewater	65	4	35.9	0.00	
Buckmans	54	0	27.8	0.60	6.0
Clayton	79[j]	8[j]	41.8[j]	T.	T.
Deming*[k]	85	28	51.5	1.42	
East Lasvegas†	65	10	40.9	0.49	0.5
Eddy	83	19	53.8	0.55	
Engle†	74	16	47.2	0.12	
Espanola	67	16	40.8	0.22	
Folsom	67	5	37.8	0.12	1.3
Fort Bayard	72	18	44.0	0.96	3.0
Fort Union	68	1	37.2	0.02	0.2
Fort Wingate	65	6	36.0	.....	
Gallisteo†	68	19	42.8	0.00	
Gallinas Spring†	78	7	43.1	0.22	
Gila	76	25	49.2	1.58	
Hillsboro	76	23	49.8	0.59	3.0
Laluz	73	27	51.2	0.54	
Las Cruces†	77	12	49.1	0.26	
Lordsburg*[l]	70	32	52.3	0.75	
Los Lunas	74	12	44.8	0.30	
Lower Penasco	72	17	48.0	0.10	1.0
Monero	55	2	34.0	0.61	4.0
Puerto de Luna	73	14	47.4	0.30	
Rincon†	82	14	51.9	0.15	
Roswell†	82	14	50.7	T.	
San Marcial	85	18	52.6	0.03	
Shattucks Ranch	75	10	46.1	1.14	2.0
Socorro	74	18	46.8	0.92	
White Oaks†	66	14	42.8	1.32	.....
Winsors Ranch	53	4	31.3	0.71	8.0
New York.					
Adams	.....	.....	.....	1.15	.....
Addison	68	15	41.6	2.30	2.0
Akron	.....	.....	.....	1.75	.....
Alden	69	10	41.1	2.26	1.0
Alfred	69	8	39.8	3.82	5.0
Angelica†	69	10	40.4	3.39	1.0
Appleton	68	10	39.4	1.22	0.0
Arcade	66	12	39.1	2.97	2.0
Atlanta	.....	.....	.....	1.98	.....
Auburn	73	14	43.0	2.31	2.0
Avon	73	7	41.4	1.93	0.0
Baldwinsville	72	18	41.8	1.52	T.
Bedford	69	19	43.0	2.36	6.9
Big Sandy*[m]	62	10	43.1	.....	.....
Binghamton†	68	16	40.8	2.99	3.7
Bolivar	70	6	39.8	5.36	3.0
Bouckville	67	8	37.7	2.39	2.0
Boyds Corners	.....	.....	.....	2.64	.....
Brentwood	67	14	41.9	5.25	6.5
Brooklyn	70	25	44.9	3.23	4.5
Canajoharie	65	12	40.0	1.01	0.5
Canton	63	0	36.8	1.47	
Carmel	64	19	42.7	2.43	6.5
Catskill	68	20	42.0	1.16	2.0
Cedarhill	68	15	42.7	1.17	2.0
Charlotte*[n]	64	19	40.4	.....	.....
Chenango Forks	.....	.....	.....	1.00	.....
Cherry Creek	.....	.....	.....	2.78	.....
Cooperstown†	63	6	37.4	2.14	2.0
Cortland	68	12	40.4	2.07	3.5
Dekalb Junction	.....	.....	.....	1.46	.....
Dryden	68	10	39.8	.....	.....
Eagle Mills	.....	.....	.....	1.35	.....
Easton	.....	.....	.....	2.38	.....
Elizabethtown	60	— 2	35.5	1.35	T.
Elmira	71	15	43.7	2.53	3.0
Fleming	72	16	41.9	1.42	3.0
Fort Niagara†	65	14	40.2	0.87	.....
Franklinville	68	5	40.2	3.50	2.5
Fulton	.....	.....	.....	1.86	.....
Garrattsville	64	6	37.7	0.61	T.
Glens Falls	63	8	36.2	0.79	T.
Gloversville	55	5	36.2	3.04	2.0
Greenwich	61	6	38.1	1.57	T.
Haskinsville	.....	.....	.....	1.98	.....
Honeymead Brook	64	17	41.5	2.56	3.0
Humphrey†	67	15	40.8	3.87	3.6
Ithaca	70	12	41.2	1.63	0.8
Jamestown	68	15	41.2	3.64	2.0
Keene Valley	60	1	35.1	2.30	T.
Kings Station	.....	.....	.....	1.74	.....
Lake George	61	5	37.9	1.17	0.5

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
New York—Cont'd.	°	°	°	*Ins.*	*Ins.*
Lake Placid	57	2	35.0	2.04	0.8
Liberty	63	15	37.2	.....	.....
Little Falls	60	15	36.4	2.79	1.5
Lockport	68	18	41.5	1.37	T.
Lowville	60	4	37.6	1.63	.....
Lyndonville	.....	.....	.....	1.43	.....
Lyons	72	21	43.3	2.37	T.
Madison Barracks†	65	5	38.5	0.65	.....
Middletown	69	17	43.0	3.59	0.5
Mohonk Lake	61	16	39.5	2.93	1.0
Napoli	.....	.....	.....	3.32	.....
Newark Valley	.....	.....	.....	2.26	.....
New Lisbon	66	3	36.8	1.68	2.2
Niagara Falls	.....	.....	.....	1.46	.....
North Hammond†	70	8	40.6	2.08	T.
North Lake	57	— 3	33.2	2.79	0.5
Number Four†	57	4	35.2	2.14	0.7
Ogdensburg	62	10	39.1	1.59	.....
Oneonta	71	13	40.8	3.01	.....
Oxford	66	7	38.6	2.75	.....
Palermo	69	15	39.8	1.26	
Penn Yan	72	16	42.2	1.61	3.4
Perry City	69	7	38.6	1.85	3.6
Phœnix	.....	.....	.....	1.83	.....
Pine City	.....	.....	.....	2.65	.....
Plattsburg Barracks†	58	6	35.0	1.29	.....
Port Jervis	71	15	42.9	2.95	2.0
Poughkeepsie	68	17	41.8	2.43	1.5
Primrose	70	17	42.4	2.92	1.8
Ridgeway	69	15	40.9	1.30	
Rome	69	12	38.2	3.45	
Romulus	71	18	42.3	1.90	2.0
Rose	.....	.....	.....	2.22	.....
St. Johnsville	62	10	39.0	2.27	0.5
Saranac Lake	62	5	37.4	1.25	T.
Saratoga Springs	60	8	38.2	1.78	0.8
Setauket†	62	27	42.6	3.40	2.5
Sherwood	.....	.....	.....	1.71	.....
Skaneateles	.....	.....	.....	2.58	.....
South Canisteo	71	10	40.2	4.53	7.3
Southeast Reservoir	.....	.....	.....	2.89	.....
South Kortright†	70	8	38.6	1.82	.....
Straits Corners	65	8	38.9	2.71	5.3
Ticonderoga	64	5	39.8	0.82	
Wappingers Falls	67	18	43.2	3.62	6.5
Warwick	.....	.....	.....	2.26	.....
Watertown	67	12	41.4	1.79	T.
Watkins	72	14	42.0	1.59	1.7
Waverly†	69	13	41.8	2.43	3.1
Wedgwood	69	13	40.4	2.62	8.0
Westfield	71	17	41.8	2.78	.....
Westpoint†	65[o]	20	43.6[o]	2.48	.....
Willetspoint	70	24	42.8	4.14	4.8
North Carolina.					
Abshers	85	21	51.2	4.14	3.0
Asheville†	86	25	51.7	2.95	
Beaufort†	74	30	56.8	3.23	
Biltmore†	89	23	52.2	3.03	
Bryson City†	.....	.....	.....	7.28	
Chapelhill†	.....	24	.....	5.30	
Edenton	84	28	55.6	3.66	
Experimental Farm	85[d]	27[o]	55.0[o]	4.61	
Fairbluff†	.....	.....	.....	3.28	
Fayetteville†	89	26	57.1	2.93	
Flatrock	83	17	51.0	5.17	
Greensboro†	84	27	53.8	4.42	
Greenville	.....	.....	.....	2.42	
Henderson†	86	27	53.8	4.40	
Highlands	75	15	47.9	11.30	
Horse Cove	77	21	51.9	8.39	
Lenoir*†	80	25	52.3	4.65	
Linville†	75	30	44.0	3.71	2.0
Littleton†	86	22	51.2	3.93	
Louisburg†	86	21	55.4	5.06	
Lumberton†	85	28	56.5	2.76	
Lynn†	85	28	55.0	4.43	
Mana	.....	.....	.....	2.59	
Marion	88	24	52.8	4.06	T.
Mocksville	89	30	54.6	4.61	0.2
Moncure†	86	25	56.0	4.98	
Monroe†	85	27	56.8	4.07	
Morganton	86	23	58.0	2.97	
Mountainy	82	25	50.6	2.60	
Mount Pleasant	85	28	55.8	5.77	T.
Murphy†	.....	.....	.....	5.46	
Oakridge†	83	26	51.4	3.20	
Pantego	.....	.....	.....	2.89	
Pittsboro†	84	22	53.7	5.03	
Rockingham†	89	28	58.6	3.26	
Roxboro†	85	18	50.8	3.55	T.
Salem†	86	26	53.5	3.83	
Salisbury†	87	21	54.3	5.57	T.
Saxon†	86	30	51.8	3.06	1.0
Selma	89	25	56.2	3.20	
Settle	86	28	55.1	2.40	T.
Sloan†	87	26	57.4	4.48	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
North Carolina—Cont'd.	°	°	°	*Ins.*	*Ins.*
Soapstone Mount†	86	30	54.4	5.42	T.
Southern Pines *a*†	89	30	59.0	3.77	
Southern Pines *b*	89	28	58.6	3.48	
Southport†	74	29	58.4	1.94	
Springhope*[i]	83	23	53.2	3.71	
Tarboro	91	20	55.8	3.24	
Wash Woods	.....	.....	.....	3.18	
Waynesville†	80	20	52.1	5.48	
Weldon†	88	24	55.2	4.37	
North Dakota.					
Amenia	62	— 9	25.8	0.44	4.2
Ashley†	64	—11	24.2	0.48	2.7
Berlin	66	— 8	24.7	0.49	4.0
Bottineau	39	—18	12.4	0.75	7.5
Buxton	55	— 6	23.2	0.30	3.0
Churchs Ferry	61	— 9	21.0	0.55	5.5
Coal Harbor	65	—11	20.6	0.91	9.1
Devils Lake	60	— 8	24.9	0.43	3.8
Dickinson	65	—18	19.6	0.38	3.8
Ellendale	63	— 6	27.6	0.73	3.7
Falconer	59	—14	20.5	0.50	5.0
Fargo†	61	— 9	23.6	0.34	3.4
Forman†	65	— 7	26.0	1.28	10.0
Fort Berthold	74	— 9	26.7	0.60	6.0
Fort Yates†	70	— 8	25.4	2.16	12.6
Fullerton[j]	65*	— 8	24.8	0.67	3.9
Gallatin†	63	—10	23.0	0.65	4.4
Glenullin	65	—11[k]	19.1[l]	0.30	2.0
Goetz	52	—10	17.4	0.77	7.7
Grafton†	47	— 7	20.8	0.20	2.0
Hamilton	47	— 8	21.0	1.25	5.0
Jamestown†	66	—10	24.6	0.62	6.2
Kelso	64	— 8	25.0	.....	.....
Larimore†	55	— 6	21.4	0.30	3.0
McKinney	54	—19	15.2	2.00	16.0
Mayville	60	— 4	26.0	0.54	5.4
Medora†	65	—24	20.6	1.50	15.0
Melville	63	—10	23.8	0.49	4.9
Milton†	43	—12	17.7	0.50	5.0
Minnewaukon	58	—10	19.2	0.32	3.2
Minot	52	— 8	19.4	0.60	6.0
Minto†	50	— 8	22.4	0.58	5.8
Napoleon†	64	—14	23.0	0.75	7.5
New England City	55	—21	17.2	1.14	11.4
Oakdale†	61	— 9	21.0	1.50	15.0
Portal	49	—23	14.0	1.30	13.0
Power†	66	—10	25.6	0.35	3.5
St. John†	47	— 5	18.6	1.40	14.0
Sheyenne	63	—12	20.6	0.66	5.6
Steele†	64	—11	22.6	0.30	3.0
Towner†	55	—12	16.2	.....	.....
University	56	— 6	23.8	0.57	5.7
Valley City†	64	— 8	24.1	1.05	10.5
Wahpeton†	67	— 5	30.6	1.42	14.2
White Earth	58	—18	17.4	0.45	4.5
Whites Ranch	68	—19	23.4	1.93	17.0
Wildrice†[g]	.....	.....	24.4	1.56	11.4
Willow City	56	—15	18.7	0.40	4.0
Woodbridge†	43	—15	15.9	0.16	1.6
Ohio.					
Akron	75	13	43.8	5.38	3.0
Annapolis	77	12	44.8	5.45	3.0
Ashland	74	17	41.6	5.33	4.0
Ashtabula	73	15	42.4	2.39	2.0
Atwater	.....	.....	.....	5.37	1.0
Bangorville	73	14	43.3	7.90	2.0
Basil	.....	.....	.....	8.82	7.0
Bement	.....	.....	.....	5.72	T.
Benton Ridge	73	12	43.6	4.48	1.0
Bethany	75	27	50.6	7.69	3.0
Bigprairie	70	15	43.0	5.72	2.0
Binola	.....	.....	.....	4.07	2.5
Bissells	73	11	42.8	4.55	0.6
Bloomingburg	75	20	46.6	6.02	4.0
Bowling Green	73	5	42.8	4.94	1.8
Bucyrus	80	10	41.8	5.50	.....
Cambridge	77	15	43.8	4.83	3.0
Camp Dennison	76	25	48.0	7.01	5.0
Canal Dover	77	19	43.9	8.43	2.0
Canton†	77	17	45.2	5.80	2.6
Cardington	74	12	43.0	9.11	0.5
Carrollton	73	13	44.5	6.88	2.0
Cedarville	.....	.....	.....	11.09	3.5
Celina	76	16	44.3	4.80	1.0
Circleville	77	24	47.2	6.40	4.0
Clarksville	74	21	47.2	7.72	5.9
Cleveland *a*	74	16	43.2	4.77	1.8
Cleveland *b*	74	15	42.2	4.07	1.5
Clifton	76	21	45.7	8.53	4.3
Coalton	77	22	47.9	4.94	4.0
Colebrook	74	9	43.0	3.89	0.5
Dayton *a*	76	21	47.1	8.00	3.5
Dayton *b*†	.....	.....	.....	8.23	2.1
Defiance	72	11	42.4	4.39	2.0
Delaware	76	19	44.8	8.14	4.5
Demos	75	17	43.9	5.40	4.0

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Ohio—Cont'd.	°	°	°	*Ins.*	*Ins.*
Dupont	73	18	43.0	4.50	3.0
Elyria	74	11	42.4	4.51	2.5
Fairport Harbor *[10]	68	12	41.3	.....	.....
Fayetteville	76	20	47.0	7.16	6.4
Findlay	74	14	43.6	4.67	2.0
Frankfort	78	20	47.2	7.12	4.0
Garrettsville †	75	8	42.8	4.92	2.0
Granville	70	18	43.8	8.09	3.0
Gratiot	75	20	44.2	6.16	5.5
Greenfield	75°	28°	48.4°	6.12	4.0
Greenhill	77	10	43.2	5.81	1.8
Greenville	73	22	43.7	8.59	4.0
Hackney	79	16	49.0	4.87	1.0
Hanging Rock	78	25	49.0	5.60	T.
Hedges	73	12	43.5	4.33	2.0
Hillhouse	72	5	41.0	4.67	1.0
Hillsboro †	78	26	47.9	5.50	5.7
Hiram	73	13	42.9	5.14	1.0
Hudson	73	6	43.5	4.34	1.0
Jacksonboro	72	24	46.3	8.28	5.0
Kenton	76	16	45.4	5.72	2.3
Killbuck	78	14	44.6	6.69	2.0
Leipsic	74	8	42.2	3.98	2.0
Levering	75	8	42.0	8.74	1.0
Logan	81	21	47.9	5.64	6.0
Lordstown	77	9	42.9	4.47	2.0
McArthur	77	18	45.5	4.55	9.0
McConnelsville †	79	20	46.7	6.54	7.0
Mansfield †	.....	.....	.....	7.31	1.5
Marietta *b*	77	21	49.2	6.03	1.0
Marion	76	15	44.3	6.70	1.8
Medina	74	8	43.4	4.47	3.0
Milfordton	73	13	42.0	8.26	5.0
Milligan	81	13	45.4	5.41	10.0
Millport	76	10	43.4	6.23	0.5
Montpelier	68	10	41.7	5.79	2.0
Napoleon	70°	8	44.4	4.91	2.0
Neapolis	.....	.....	.....	4.55	.....
New Alexandria	76	15	45.4	6.25	5.0
New Berlin	76	15	43.8	5.39	2.0
New Bremen	71	17	44.2	3.22	.....
New Holland	76	17	45.8	6.55	5.0
New Moscow	.....	.....	.....	7.05	.....
New Paris	73	22	45.4	10.20	3.0
New Waterford	76	13	45.4	6.10	2.5
North Lewisburg	77	14	43.8	9.85	4.0
North Royalton	74	9	43.4	3.96	3.0
Norwalk	76	8	43.0	3.51	2.0
Oberlin	78	10	43.8	3.56	T.
Ohio State University	77[1]	18	47.6°	7.86	4.0
Orangeville	75	10	42.0	4.49	2.0
Ottawa	75	17	45.4	3.96	2.0
Pataskala †	77	16	45.0	7.97	5.0
Perry	.....	.....	.....	5.15	1.0
Philo	78	19	45.1	5.37	7.2
Plattsburg	74	19	45.0	8.82	5.0
Pomeroy	84	24	48.6	4.16	2.5
Portsmouth *a* †	.....	.....	.....	5.14	3.5
Portsmouth *b*	77	27	51.0	5.14	2.0
Richwood	76	13	45.1	7.72	2.5
Ridgeville Corners	71	7	42.6	4.93	1.0
Ripley	73	26	48.9	6.56	4.4
Rittman	75	8	42.3	5.78	1.5
Rockyridge	79	10	42.7	4.79	2.2
Rosewood	74	15	44.0	9.13	3.0
Shenandoah	76	8	42.2	4.21	0.6
Sidney *b*	74	19	42.8	7.89	3.8
Sinking Spring †	73	26	48.1	5.15	10.0
Somerset †	75	24	47.8	5.95	5.9
Springboro	.....	.....	.....	8.70	5.0
Spring Valley	75	22	44.6	8.06	4.0
Strongsville	.....	.....	.....	4.62	2.0
Sylvania	70	6	40.4	5.02	T.
Thurman	79	27	49.4	4.45	2.0
Tiffin †	73	13	44.0	4.92	1.5
Upper Sandusky	74	13	44.6	4.71	1.0
Urbana	75	19	44.0	8.25	2.0
Vanceburg	77	23	49.1	5.15	1.0
Vanwert	75	15	43.2	3.96	2.0
Vermilion	74	10	41.9	4.09	3.0
Vickery	72	8	43.1	3.80	0.3
Walnut	.....	.....	.....	6.04	4.1
Warren	77	12	43.6	5.06	.....
Warsaw	78	10	43.8	8.47	5.0
Wauseon	71	9	42.7	8.08	1.2
Waverly	78	25	48.4	4.50	4.0
Waynesville	74	24	44.2	8.32	4.5
Wellington	76	9	43.3	3.74	3.0
Westerville	74	17	45.8	8.95	5.5
Willoughby	.....	.....	.....	3.33	3.0
Wooster *b* †	71	12	43.3	6.44	3.5
Youngstown	77	14	44.3	4.62	0.5
Zanesville †	.....	.....	.....	5.52	5.0
Oklahoma.					
Anadarko †	85	15	52.6	4.61	
Arapaho †	81	7	46.3	1.79	
Oklahoma—Cont'd.					
Beaver	.....	.....	.....	1.11	3.0
Burnett †	82	18	49.4	6.19	.....
Clifton †	85	17	48.4	4.36	1.0
Edmond	78	20	49.5	2.28	T.
Fort Reno †	82	19	49.4	1.53	T.
Fort Sill	80	24	53.6	3.24	T.
Hennessey	.....	19	.....	1.64	
Hopeton	.....	.....	.....	0.13	T.
Jefferson	78	12	47.7	1.43	
Kingfisher	82	20	49.8	2.79	
Mangum †	81	19	48.4	1.32	
Newkirk	73	18	46.2	3.49	
Norman †	83	22	49.3	5.35	
Pawhuska	74	21	48.6	4.75	
Prudence †	.....	16	.....	2.67	
Putnam	78	11	45.0	0.83	T.
Sac and Fox Agency	83	19	49.6	4.04	T.
Stillwater †	75	21	49.6	2.75	
Waukomis	78	18	49.2	1.32	
Winnview	77[k]	17[k]	46.1[k]	1.56	
Oregon.					
Albany *a*	68	25	45.0	2.08	
Arlington	67	15	42.8	0.15	0.2
Ashland *b*	67	21	42.4	0.68	4.3
Aurora *[8]	63	29	42.5	1.04	
Aurora (near)	67	21	42.7	1.71	T.
Bandon	59	29	44.4	4.59	
Bay City †	64	25	42.6	8.61	3.2
Beulah	59	3	33.6	0.08	T.
Brownsville *[8]	65	29	47.4	1.51	0.5
Burns	59	4	31.7	T.	T.
Burns (near)	65	5	35.2	0.21	1.5
Cascade Locks	64	28	44.1	5.56	
Corvallis	66	26	44.0	2.34	T.
Dayville †	69	8	38.7	0.58	2.2
Eugene	65	26	42.2	1.90	2.0
Fairview	66	27	44.8	6.14	7.5
Falls City	62	25	43.2	3.84	
Fife †	59	3	30.8	0.30	3.0
Forestgrove	65	22	42.6	2.03	
Fort Klamath	56	4	31.8	1.61	10.2
Gardiner	65	29	45.6	5.83	
Glenora	65	23	42.0	6.81	7.0
Government Camp	63	3	31.2	6.19	49.0
Grants Pass *a* †	73	22	44.6	0.98	T.
Happy Valley	65	3	31.8	0.35	2.0
Heppner	65	12	39.2	1.05	4.5
Hood River (near)	61	21	41.8	2.10	
Jacksonville	66	30	43.0	0.92	0.2
Joseph	55	1	28.7	2.40	23.0
Junction City *[8]	62	28	44.4	2.13	2.1
Klamath Falls	69°	12°	37.2°	0.35	3.3
Lafayette *[8]	66	30	44.8	1.02	
Lagrande	61	7	35.8	1.16	8.5
Lakeview †	60	6	33.7	0.10	1.0
Langlois	73	28	47.8	4.02	
Lone Rock	65	6	36.4	0.58	8.0
Lorella	61	4	31.9	0.38	
McMinnville	65	22	43.0	2.06	0.1
Merlin *[8]	68	20	40.5	0.60	
Monmouth *a* *[8]	62	29	44.7	1.51	
Monmouth *b*	65	23	43.0	2.10	0.2
Monroe	64	27	42.6	2.61	1.5
Moro	59	16	39.5	0.42	3.0
Mount Angel †	68	25	44.1	2.79	T.
Newberg	66	25	42.7	1.68	.....
Newbridge	59	10	36.4	0.41	2.0
Newport	68	29	45.4	3.81	T.
Pendleton	67	13	39.2	0.66	
Prineville	74	5	39.8	0.99	3.0
Riddles *[8]	68	22	42.6	1.33	1.0
Riverside	68	1	36.2	T.	T.
Salem *b* †	63	24	43.2	2.15	
Sheridan *[8]	64	28	43.9	1.80	
Silver Lake	64	— 4	30.8	0.15	1.5
Silverton *[8]	64	30	42.8	2.02	
Siskiyou *[8]	76	18	43.3	0.02	0.2
Sparta	51	0	29.8	1.60	16.0
Springfield *[8]	63	29	42.1	2.16	
Stafford	63	24	42.3	2.03	.....
The Dalles †	68	26	45.6	0.30	
Tillamook Rock	.....	.....	.....	2.67	
Toledo	68	20	45.8	4.51	2.2
Umatilla	.....	.....	.....	0.44	1.5
Vale	59	9	36.8	0.12	
Vernonia	65	22	41.8	3.38	6.0
Weston	68	13	38.9	1.91	11.7
Williams	68	19	42.9	0.47	.....
Pennsylvania.					
Altoona	80	17	43.8	5.81	.....
Aqueduct	70	20	46.4	3.18	2.9
Athens	67	14	42.2	2.06	1.6
Beaver Dam	.....	.....	.....	7.06	.....
Bethlehem	.....	.....	.....	2.79	.....
Brookville †	.....	.....	.....	7.42	2.0
Browers Lock	.....	.....	.....	2.93	.....
Pennsylvania—Cont'd.					
Cameron	.....	.....	.....	6.71	3.0
Carlisle	77	23	45.5	4.76	5.0
Cassandra	76	14	43.4	5.42	4.0
Cedarrun	.....	.....	.....	3.50	3.0
Centerhall †	77	17	42.8	5.16	10.0
Chambersburg †	78	.....	.....	4.33	4.0
Coatesville	75	21	46.5	2.95	2.4
Confluence †	81	15	44.6	6.79	1.0
Coopersburg	77	22	47.8	2.55	7.5
Davis Island Dam †	.....	.....	.....	5.39	1.0
Derry Station	73	17	46.6	5.82	3.0
Doylestown	.....	.....	.....	3.08	.....
Drifton	70°	16°	42.0°	2.45	3.2
Driftwood	.....	.....	.....	7.58	5.0
Duncannon	.....	.....	.....	3.70	3.0
Dushore	64	10	39.9	3.42	5.0
Dyberry	66	9	39.5	3.90	5.0
East Bloomsburg	.....	.....	.....	3.75	0.7
East Mauch Chunk	75	18	44.2	3.48	7.0
Easton	71	22	45.2	3.07	1.2
Ellwood Junction †	.....	.....	.....	6.67	3.2
Emporium	74	13	43.2	5.80	4.2
Everett	82	17	44.2	4.62	4.0
Farrandsville	.....	.....	.....	5.29	2.0
Forks of Neshaminy *[1]	66	29	45.4	3.10	T.
Franklin	74	6	43.4	4.29	1.0
Frederick	.....	.....	.....	2.72	.....
Freeport †	.....	.....	.....	6.72	5.0
Girardville	.....	.....	.....	4.26	12.0
Grampian	76	8	41.4	8.40	4.0
Greensboro †	80	18	48.2	6.05	T.
Greenville	72	16	44.2	5.53	2.6
Hamburg	77	22	46.2	4.01	4.0
Hawley	60	12	39.8	3.74	3.5
Hollidaysburg	83	16	45.8	5.38	4.5
Huntingdon *a* †	82	19	45.6	5.00	3.0
Huntingdon *b*	.....	.....	.....	4.79	2.5
Irwin	.....	.....	.....	4.96	T.
Johnstown †	82	16	45.2	6.49	3.0
Karthaus	.....	.....	.....	6.14	4.0
Keating	.....	.....	.....	5.24	2.0
Kennett Square	72	21	47.4	3.21	.....
Lansdale	.....	.....	.....	2.94	.....
Lawrenceville [8]	67	10	41.4	2.59	5.0
Lebanon	78	21	45.8	3.20	5.0
Leroy †	63	17	39.8	3.39	9.7
Lewisburg	67	21	44.3	4.23	5.2
Lock Haven *a* †	68	17	46.6	5.79	4.0
Lock Haven *b*	.....	.....	.....	5.02	4.0
Lock No. 4 †	.....	.....	.....	5.64	0.5
Lycippus	79	15	46.2	6.22	5.8
Mifflin	.....	.....	.....	1.70	2.5
Oil City †	.....	.....	.....	5.74	1.5
Ottsville	.....	.....	.....	2.83	.....
Parker †	.....	.....	.....	7.17	4.0
Philadelphia *b*	72	24	47.8	3.42	1.5
Point Pleasant	.....	.....	.....	2.46	.....
Pottstown	76	24	46.5	3.07	1.0
Quakertown	75	19	44.2	3.19	6.5
Reading [2]	.....	.....	45.6	2.12	.....
Reedsville	70	17	42.5	.....	.....
Renovo *a*	.....	.....	.....	5.49	3.0
Renovo *b*	65	16	43.8	5.53	4.8
Ridgway †	.....	.....	.....	6.87	3.0
Saegerstown	74	4	40.8	4.30	0.8
St. Marys	70	7	40.2	6.90	6.0
Salem Corners	67	15	40.0	3.86	6.4
Scranton	65	19	43.0	3.50	7.0
Seisholtzville	.....	.....	.....	2.40	.....
Selinsgrove	72	22	44.4	3.87	2.0
Shawmont	.....	.....	.....	2.55	2.7
Shinglehouse	72	8	41.5	3.39	0.5
Sinnamahoning	.....	.....	.....	6.06	.....
Smethport	72	12	41.0	5.57	6.0
Smiths Corners	.....	.....	.....	2.87	.....
Somerset	76	12	43.6	5.38	3.5
South Eaton	68	18	42.7	3.16	3.5
State College	66	17	43.4	5.63	1.2
Sunbury	.....	.....	.....	3.00	3.0
Swarthmore	71	24	46.6	3.27	4.0
Swiftwater	68	16	40.2	3.73	1.0
Towanda	66	14	42.4	2.59	5.5
Trout Run	.....	.....	.....	5.32	6.0
Uniontown	78	20	48.0	5.26	T.
Warren †	72	12	42.7	3.82	1.0
Wellsboro †	65	10	41.8	4.78	6.5
West Chester	71	21	46.0	3.13	2.8
West Newton †	.....	.....	.....	5.77	.....
Westtown	70°	22°	44.0°	2.88	3.0
White Haven	71	16	41.1	3.62	5.0
Wilkesbarre †	69	20	44.6	2.76	0.3
Williamsport	65	22	44.2	3.44	4.0
York †	73	23	46.4	3.00	2.0
Rhode Island.					
Bristol	57	24	40.7	3.37	5.0
Kingston	61	22	40.1	3.71	10.0

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Rhode Island—Cont'd.	°	°	°	*Ins.*	*Ins.*
Lonsdale	.....	.....	.....	2.83	10.0
Pawtucket	63	26	44.6	2.73	10.5
Providence *a*	64	26	44.2	2.95	7.0
Providence *b*	62	23	41.6	2.91	7.0
South Carolina.					
Allendale	85	28	58.8	1.36	
Anderson †	.....	.....	.....	4.16	
Batesburg †	85	31	58.2	3.32	
Blackville †	89	30	61.2	2.63	
Camden †	.....	.....	.....	3.45	
Cheraw *a* †	89	30	58.3	2.36	
Cheraw *b* †	.....	.....	.....	3.16	
Clemson College	82	24	56.4	3.20	
Conway †	.....	.....	.....	2.89	
Darlington (near)	.....	.....	.....	2.64	
Edisto †	.....	.....	.....	2.96	
Effingham †	.....	.....	.....	2.03	
Florence †	86	33	59.2	1.44	
Gaffney †	.....	.....	.....	3.76	
Georgetown †	86	34	62.9	2.75	
Gillisonville	92	32	63.8	1.61	
Greenville †	80	22	54.2	3.42	
Greenwood	84	29	56.8	3.77	
Holland	83	24	55.8	4.75	
Kingstree *a* †	87	28	60.1	2.63	
Kingstree *b*	.....	.....	.....	2.63	
Little Mountain	89	27	58.0	4.80	
Longshore †	85	26	57.0	4.92	
Marion	87	33	60.2	2.00	
Mount Carmel †	.....	.....	.....	4.22	
Pinopolis *[1]	85	32	59.8	2.85	
Port Royal †	81	38	62.6	2.66	
St. George †	88	31	61.9	1.95	
St. Matthews †	87	32	59.2	2.69	
St. Stephens †	.....	.....	.....	2.66	
Santuck †	85	29	56.1	4.83	
Shaws Fork	90	30	62.2	4.76	
Smiths Mills †	.....	.....	.....	3.15	
Society Hill †	86	30	59.1	4.20	
Spartanburg	85	28	54.4	2.72	
Statesburg †	87	31	60.5	2.71	
Trenton	84	34	61.6	5.38	
Trial	88	25	58.6	3.13	
Walhalla	85	22	54.5	5.07	
Winnsboro	85	31	57.1	4.96	
Yemassee †	88	33	62.4	1.54	
Yorkville	87	28	57.6	5.06	
South Dakota.					
Aberdeen †	65	— 3	27.4	1.33	3.5
Alexandria †	74	— 1	33.4	0.30	1.0
Armour	74	— 1	34.2	0.84	3.5
Ashcroft †	62	—24	23.4	2.78	27.8
Bowdle	69	— 9	25.4	1.40	9.0
Brookings †	64	— 4	32.6	0.40	4.0
Canton	68	4	34.8	0.89	2.2
Castlewood [4]	68	— 5	30.2	0.52	1.2
Centerville	.....	.....	.....	1.06	5.6
Chamberlain †	71	— 1	33.6	0.90	3.5
Clark	.....	.....	.....	1.65	6.0
De Smet	65	—12	28.2	0.87	6.0
Doland	64	—10	29.4	1.18	5.7
Edgemont	59[5]	— 4[5]	31.3[5]	0.64	6.5
Eureka	64	—12	25.4	0.80	5.5
Farmingdale	.....	.....	.....	0.12	T.
Flandreau	69	— 1	32.8	1.15	5.3
Forestburg †	69	— 4	30.9	0.43	2.3
Forest City	69	— 3	27.8	0.40	4.0
Fort Meade †	68	— 8	27.7	0.83	8.2
Gann Valley	67	— 5	30.4	0.30	2.0
Gary	65	— 4	29.5	0.95	1.5
Goudyville	68	—10	27.1	0.61	3.1
Greenwood	74	1	34.0	0.82	4.3
Harney	68	— 9	26.5	0.97	14.0
Highmore	65	— 4	30.3	1.40	8.0
Hotch City †	69	— 9	31.2	0.20	2.0
Hot Springs	57	3	29.7	0.50	7.6
Howard †	68	— 6	31.6	1.25	2.5
Interior	69	— 3	31.2	0.10	1.0
Ipswich	68	— 7	26.9	0.58	2.5
Kimball †	69	— 3	32.2	0.87	5.7
Leslie †	68	—21	27.2	0.26	.....
Mellette †	66	— 3	29.3	0.45	4.5
Menno †	71	0	34.7	0.92	3.5
Millbank	70	— 4	29.8	0.90	3.0
Mitchell †	73	— 1	33.0	0.34	1.0
Montrose	64	— 3	32.1	0.68	3.8
Nowlin	67	— 7	29.5	0.45	4.5
Oelrichs †	66	— 5	28.9	0.90	8.0
Parker †	67	2	31.9	0.98	4.5
Parkston	73	— 2	32.6	0.50	2.5
Plankinton †	70	— 3	32.2	0.55	2.5
Redfield	65	— 5	31.0	0.50	1.7
Rochford	60	— 9	24.2	2.20	22.0
Rosebud	72	— 3	32.0	1.20	12.0
Shiloh	60	— 1	31.4	0.50	T.
Silver City	.....	.....	.....	1.56	15.8
Sioux Falls †	68	0	32.2	0.88	3.0
Spearfish †	65	— 8	27.0	1.07	18.0
Tyndall †	70	0	34.6	0.40	3.0
Watertown	64	— 6	28.6	1.10	1.0
Wentworth †	64	— 1	31.2	0.88	3.5
Wolsey	.....	.....	.....	0.60	4.5
Tennessee.					
Andersonville	78	21	53.8	4.12	T.
Ashwood *† [1]	78	30	55.5	4.01	
Benton (near) †	78	25	57.0	4.63	
Bluff City †	.....	.....	.....	4.40	
Bolivar †	82	24	55.4	4.86	
Bristol †	78	23	51.4	4.64	T.
Byrdstown	79	32	53.3	4.59	
Carthage †	80	24	55.2	4.78	
Charleston	.....	.....	.....	4.07	
Clarksville	80	26	53.4	8.31	
Clinton †	.....	.....	.....	4.01	
Decatur †	80	23	55.6	4.67	T.
Dover	82	26	54.6	7.56	
Elizabethton †	82	24	54.2	5.09	T.
Elk Valley	77	21	53.5	2.85	
Erasmus	80	15	51.8	5.30	0.5
Fairmount *[5]	75	26	52.2	2.99	
Florence †	79	24	54.4	4.92	
Franklin	82	24	54.2	4.88	
Grace *[1]	82	24	54.6	5.41	0.1
Greeneville †	81	22	53.6	5.57	T.
Harriman	79	24	55.2	3.87	T.
Hohenwald †	80	24	55.2	5.29	
Jackson †	80	24	55.7	4.65	
Johnsonville	82	21	55.2	4.90	
Jonesboro *[1]	76	27	52.1	4.63	T.
Kingston †	.....	.....	.....	3.31	
Lafayette	.....	.....	.....	7.99	T.
Liberty †	79	24	54.8	5.24	
Lynnville †	80	27	55.0	4.13	T.
McKenzie †	79	27	54.8	7.49	
McMinnville †	80	23	54.6	4.70	T.
Madison	84	30	56.0	6.34	
Maryville	.....	.....	.....	5.31	T.
Newmarket *[5]	80	24	55.7	4.77	
Newport †	82	25	55.1	4.63	
Nunnelly	81	22	55.0	5.90	
Oak Hill	79	30	54.4	4.64	T.
Palmetto †	81	24	55.4	4.10	T.
Peryear	.....	.....	.....	6.96	T.
Pope	82	21	55.8	3.70	
Rogersville †	78	25	53.0	4.56	
Rugby	80	19	51.6	3.54	T.
St. Joseph	81	21	54.6	6.11	
Savannah	81	25	56.4	4.27	T.
Sewanee †	77	29	52.8	3.65	0.5
Silverlake	77	21	48.9	4.03	4.0
Springdale	80	21	54.0	4.28	T.
Sylvia	81	24	53.9	7.01	
Tazewell	.....	.....	.....	3.88	T.
Tellico Plains †	81	30	57.2	4.44	
Tracy City	76	24	52.8	3.65	0.4
Trenton	79	25	53.6	6.74	
Tullahoma †	77	25	53.9	3.65	T.
Union City	78	27	53.3	6.75	
Waynesboro	82	22	55.1	3.92	
Wildersville	80	27	55.7	5.60	
Yukon	79	27	55.4	5.32	
Texas.					
Albany *[1]	82	28	56.5	2.71	
Anson	.....	.....	.....	3.88	
Arthur City †	.....	.....	.....	3.48	
Austin *a*	85	34	59.7	2.60	
Austin *b* *[5]	82	29	57.0	.....	
Ballinger †	90	24	57.2	0.16	
Beeville †	91	33	63.2	2.20	
Blanco †	85	29	59.3	1.50	
Boerne *[1]	87	29	60.3	1.92	
Brazoria †	80	33	62.1	4.51	
Bremond *[1]	85	30	58.0	1.40	
Brenham †	87	34	60.8	4.66	
Brighton	78	35	65.0	1.19	
Brownwood	86	24	54.5	0.15	
Burnet *[1]	84	24	56.9	1.42	
Camp Eagle Pass †	98	30	66.0	2.98	
Childress	84	20	50.9	0.97	
Coleman	88	24	58.8	0.53	
College Station	82	34	60.8	4.51	
Columbia †	84	31	62.9	4.10	
Conroe	84	30	60.8	4.74	
Corsicana *b* †	86	29	57.8	3.01	
Cuero †	84	32	60.2	2.47	
Dallas †	82	25	54.2	2.46	
Danevang †	87	31	61.8	2.74	
Dublin †	85	24	56.1	1.52	
Duval *[1]	96	32	62.5	2.33	
Emory	79	26	54.2	2.70	
Estelle †	87	30	55.8	1.57	
Forestburg	90	24	53.6	4.36	
Fort Brown	86	35	66.6	1.40	
Fort Clark	92	34	62.1	1.10	
Fort McIntosh	101	32	68.2	0.55	
Fort Ringgold †	99	30	68.6	1.72	
Fort Stockton	.....	.....	.....	0.00	
Fort Worth	.....	.....	.....	0.95	
Fredericksburg *† [1]	88	23	59.0	2.05	
Fruitland	85	23	54.9	4.33	
Gainesville	86°	26°	54.6[4]	4.36	
Golindo	.....	.....	.....	2.80	
Grapevine	86	25	57.4	2.08	
Hale Center †	78	18	51.0	T.	
Hallettsville †	86	31	64.0	1.39	
Haskell	90	20	53.9	2.82	
Hewitt	.....	.....	.....	2.75	
Houston †	82	36	62.2	2.87	
Huntsville †	85	30	60.2	3.53	
Jacksonville	87	27	60.5	2.42	
Jasper	85	30	62.3	4.30	
Kent	.....	.....	.....	0.39	
Kerrville	88	20	57.2	2.32	
Lampasas †	88	22	60.4	1.27	
Llano *† [5]	86	28	60.0	1.02	
Longview †	89	31	59.6	3.30	
Luling †	87	29	62.0	1.79	
Mann	88	28	59.6	2.25	
Marathon	83	20	55.0	0.20	2.0
Marshall	86	32	59.6	4.10	
Menardville	90	18	57.8	0.15	
Missouri City	84	31	64.8	2.71	
Mount Blanco †	82	14	50.6	T.	
New Braunfels †	88	29	61.8	1.31	
Panter	.....	.....	.....	1.25	
Point Isabel *[1]	82	48	67.5	0.10	
Rheinland †	86	24	53.6	2.68	1.0
Rockport *[1]	79	50	64.4	.....	
Rocksprings	.....	.....	.....	2.00	
Runge †	88	33	63.9	2.28	
San Antonio	91	33	64.2	1.64	
San Marcos *b* †	87	27	60.2	1.54	
Sulphur Springs †	88	27	58.6	2.21	
Temple *a*	86	29	58.7	1.75	
Tyler	86	28	58.0	3.50	
Valentine †	94	15	56.0	0.10	T.
Victoria	.....	.....	.....	1.35	
Waco †	87	31	59.3	3.15	
Waxahachie †	84	25	55.9	2.80	
Weatherford †	86	25	56.9	0.82	
Wichita Falls †	.....	.....	.....	4.65	3.5
Utah.					
Alpine †	.....	.....	.....	1.05	9.0
Blue Creek *[5]	65	9	32.8	0.80	8.0
Brigham †	.....	.....	.....	1.83	.....
Cisco †	64	12	40.2	0.02	
Corinne	64	8	34.2	0.85	8.5
Croydon [3]	70	— 5	30.0	0.85	8.5
Ferron	54	21	34.2	0.30	3.0
Fillmore †	66	3	34.2	3.07	.....
Fort Duchesne †	49	0	26.6	0.75	7.5
Frisco	61	8	34.0	0.12	1.0
Giles †	68	10	41.1	T.	
Heber	60	—14	29.8	3.30	33.0
Huntsville	.....	.....	.....	1.98	18.0
Kelton *[5]	60	12	33.4	0.00	
Levan †	61	5	33.2	1.45	14.5
Loa †	57	— 8	27.2	0.17	1.7
Logan †	60	— 1	31.2	1.34	.....
Millville	.....	.....	.....	1.63	.....
Minersville	63	6	34.6	2.08	19.9
Moab †	72	16	44.8	0.44	1.0
Mount Pleasant †	65	7	35.1	1.50	15.0
Ogden *a* *[5]	67	20	37.9	1.82	18.2
Ogden *b*	66	12	38.2	2.20	22.0
Pahreah	72	11	36.8	T.	T.
Parowan †	63	3	34.3	1.66	16.6
Pinto	59	—13	30.8	1.33	3.9
Promontory *[5]	48	3	29.6	0.60	6.0
Provo	67	7	37.2	0.87	.....
Richfield †	70	8	38.2	0.40	4.0
St. George †	80	12	44.8	0.44	.....
Scipio †	62	0	32.8	3.41	12.0
Snowville	56	8	32.4	0.76	3.0
Soldier Summit	57	— 6	24.4	2.92	29.2
Terrace *[5]	57	6	28.6	0.32	3.2
Thistle	63	1	32.1	0.75	7.5
Tooele †	65	6	35.0	2.38	.....
Tropic	68°	7°	29.6°	T.	T.
Vernal	54	6	31.4	0.60	5.7
Vermont.					
Bennington	61	4	39.8	1.78	T.
Brattleboro	60	11	37.9	1.05	3.0
Burlington †	57	11	38.3	1.04	0.5
Chelsea †	54	9	33.3	0.97	T.
Cornwall	60	5	38.1	1.23	1.0
Enosburg Falls	61	— 4	36.0	1.20	0.0
Hartland †	57	2	34.2	0.82	1.0

TABLE II.—*Meteorological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Vermont—Cont'd.	°	°	°	*Ins.*	*Ins.*
Jacksonville	57	— 2	33.1	1.71	3.7
Norwich	59	2	35.4	1.07	1.5
St. Johnsbury	56	— 1	33.8	0.97	0.5
Vernon *6	58	12	37.9	1.19	2.0
Wells	58	6	35.6	1.04	0.5
Woodstock	59	— 2	35.0	0.91	3.0
Virginia.					
Alexandria	76	26	48.2	2.81	0.6
Ashland †	84	24	52.4	4.18	T.
Barboursville	83	22	51.1	4.68	5.0
Bedford City	85	28	51.8	4.03	4.5
Bigstone Gap †	80	26	54.4	4.64	T.
Birdsnest *†1	80	28	52.1	4.20	
Blacksburg	82	23	46.8	3.99	6.0
Buckingham †	84	19	48.4	2.23	2.4
Burkes Garden				4.97	6.5
Callaville †	84	22	51.8	3.68	
Christiansburg				3.08	1.3
Clarksville				2.10	
Clifton Forge	82	24	48.2	3.24	T.
Dale Enterprise †	80	15	46.2	3.90	4.0
Danville				2.35	0.5
Doswell	81	21	49.4	4.35	T.
Dwale				3.81	0.5
Farmville	83	18	51.3	3.09	T.
Fredericksburg †	81	23	49.8	4.55	3.0
Grahams Forge	81	20	47.8	3.86	2.8
Guinea				2.91	0.2
Hampton	79	30	52.0	2.97	
Hot Springs	80	27	50.0	4.10	T
Leesburg	75	18	47.2	2.43	0.2
Lexington †	82	18	48.8	3.47	7.3
Maidens	78	28	51.3	3.27	T.
Manassas †	79	23	48.9	2.93	2.0
Petersburg †	85	24	53.2	3.95	T.
Quantico	72	20	49.5		
Radford				2.95	3.0
Richmond (near) †	82	25	51.6	3.43	T.
Rockymount †	80	25	52.5	2.97	1.5
Salem †	84	29	52.2	3.35	3.0
Speers Ferry				5.08	T.
Spottsville †	85	21	53.4	4.44	
Stanardsville †	79	19	47.2	4.52	6.0
Staunton †	82	19	49.2	3.10	2.0
Stephens City †	84	21	48.4	4.39	3.0
Sunbeam †	85	25	54.3	3.91	
Warrenton	73	28	49.2	2.97	3.0
Warsaw †	79	24	49.6	5.10	
Westbrook Farm	81	25	47.0		
Westpoint	81			4.15	
Woodstock †	84	18	49.7	3.79	1.5
Wytheville †	79	24	48.2	4.15	3.5
Washington.					
Aberdeen	61	25	41.4	4.41	T.
Anacortes				2.57	
Ashford †				3.20	15.0
Blaine †	60	13	36.1	2.07	2.5
Centerville †	71	11	40.5	0.21	2.0
Chehalis †	62	26	44.6	0.43	T.
Clearwater	62	27	43.0	7.42	
Colfax	58	14	36.6	2.20	14.0
Coupeville †	58	23	42.8	1.67	T.
Dayton	66	14	39.8	2.02	8.5
Ellensburg	62	14	39.4	0.12	
Ellensburg (near)	60	12	38.3	0.30	2.5
Fort Simcoe †	67	14	41.8	T.	T.
Fort Spokane	55	12	37.1	0.85	5.0
Grandmound †	60	21	41.8	3.20	
Hunters †	50	1	30.5	0.98	10.0
Kennewick †	69	10	44.2	0.14	0.2
Lacenter	63	24	41.3	2.82	3.5
Lakeside	58	21	39.8	0.08	T.
Lapush	50	27	38.0	3.48	T.
Lind	55	12	37.4	0.16	0.2
Loomis †	57	17	38.6	0.38	T.
Madrone †	60	22	42.4	1.19	4.0
Mayfield †	63	23	42.2	4.52	
Moxee Valley †	77	10	41.0	0.15	0.8
New Whatcom	55	25	42.6	2.21	
Northbend	62	28	42.6	5.47	
Olga	58	25	41.5	3.12	
Olympia †	62	23	42.6	1.98	
Orcas Island				2.42	0.5
Pinehill †	62	18	42.4	0.78	0.2
Pomeroy	58	16	38.6	1.69	14.0
Port Townsend	59	29	43.8	1.15	0.2
Pullman †	58	9	32.6	1.72	13.0
Rosalia †	56	11	35.0	1.50	6.4
Sedro †	68	23	43.6	5.28	
Shoalwater Bay *10	55	30	44.4		
Snohomish †	71	27	43.7	4.59	4.0
Southbend	63	25	43.3	4.74	
Stampede	54	11	39.6	3.62	36.0
Stillaguamish	60	21	40.6	3.64	
Sunnyside †	68	11	42.5	0.05	T.
Union City †	59	23	43.0	2.37	1.5
Washington—Cont'd.					
Vashon †	58	26	42.9	1.39	T.
Waterville †	53	5	32.3	0.10	1.0
West Virginia.					
Beverly †	80	13	46.4	7.08	5.0
Bluefield †	78	24	50.0	3.53	1.8
Buckhannon *a* †				8.00	0.5
Buckhannon *b*	80	16	47.8		
Burlington †	83	15	46.4	5.09	3.0
Charleston †				7.06	T.
Dayton †	81	15	48.7	7.50	
Eastbank	86	27	52.1	7.22	T.
Elkhorn †	80	27	51.4	4.03	T.
Fairmont †				6.10	1.0
Glenville †	79	19	48.2	7.58	T.
Grafton †	82	15	47.8	7.14	1.0
Green Sulphur	79	21	49.2	2.58	
Harpers Ferry				4.36	0.3
Hinton *a* †				4.15	2.0
Hinton *b* †	82	24	49.3		1.0
Huntington	79	26	49.8	6.34	
Kingwood	76	15	46.7	7.71	
Marlinton †	77	15	45.6	5.23	6.0
Martinsburg †	82	22	47.2	3.35	3.0
Morgantown *b* †	82	16	47.8	6.20	T.
New Cumberland	81	11	46.4		
New Martinsville † [h]	79	18	49.1	3.67	0.5
Nuttallburg	80	17	45.7	4.25	4.0
Oldfields †	81	9	47.2	4.14	0.5
Point Pleasant †	79	26	50.5	5.81	T.
Powellton	80	27	50.5	5.21	3.0
Romney	78	19	48.1	4.13	
Rowlesburg †				6.72	5.0
Upper Tract	83	13	49.0	3.36	2.0
Weston *a*				10.05	
Weston *b* *†1	82	18	48.1		T.
Wheeling *a* †				5.15	1.3
Wheeling *b* †	83	21	49.5	5.70	T.
White Sulphur Springs	77	20	51.2	4.03	2.5
Wisconsin.					
Amherst	55	2	32.6	2.60	13.5
Antigo *	54	2	30.6	0.63	3.3
Barron	56	— 9	27.6	1.80	18.0
Bayfield	55	3	30.8	0.30	3.0
Beloit	60	11	38.0	4.50	3.5
Brodhead	62	— 1	37.3	3.70	3.5
Butternut	63	—13	31.4	1.46	14.6
Chilton	58	11	35.9	1.98	4.5
Citypoint	60	12	33.2	1.66	6.5
Delavan	61	6	36.8	3.63	4.0
Dodgeville †	60	7	35.4	2.58	7.5
Easton	58	— 2	33.6	2.83	8.8
Eau Claire	59	— 1	33.1	2.85	11.0
Florence †	53	—11	29.8	1.40	14.0
Fond du Lac	58[l]	13	36.0[f]	2.38	4.0
Grand River Locks				3.00	3.5
Grantsburg †	61	6	33.2	2.12	12.8
Gratiot	60	6	37.4	2.85	4.0
Hartford				2.88	5.0
Hartland	60	7	36.6	3.17	4.0
Harvey	59	10	37.0	2.38	4.0
Hayward	61	—13	33.2	2.65	9.0
Hillsboro	58	— 2	33.5	1.35	9.0
Kenosha *10	60	12	34.6		
Knapp	64	— 1	33.9		
Koepenick *†1	62	8	31.8	1.70	11.0
Lancaster †	62	10	35.6	2.40	7.5
Madison †	57	9	36.0	2.67	1.8
Manitowoc †	56	16	34.2	2.29	10.5
Meadow Valley †	58	— 4	33.3	2.40	7.0
Medford †	60	— 9	30.4		
Menasha				1.89	3.8
Neillsville	58	— 8	32.6	2.73	11.0
New Holstein	54	8	33.0	1.35	4.0
New London	55	9	33.6	2.78	2.0
North Crandon				1.75	17.5
Oconto	57	9	34.0	2.68	6.0
Osceola †	61	5	32.4	4.43	15.2
Pepin	62	6	32.7	1.46	4.0
Pine River †	57	7	34.6	2.53	8.0
Portage †	57	0	33.4	2.26	5.0
Port Washington	61	10	35.2	3.33	8.0
Prairie du Chien	66	9	40.6	2.28	3.5
Racine	65	14	37.8	3.15	4.0
Sharon	61	6	34.2	2.96	4.0
Shawano	54	5	33.2	2.23	6.0
Somo *1	57	— 6	31.9	2.31	13.5
Spooner	59	3	34.2	1.60	17.0
Stevens Point †	58	0	33.4	0.76	6.1
Sturgeon Bay Canal *9	52	12	32.6		
Valley Junction †	59	— 1	34.2	2.45	7.8
Viroqua	58	13	35.6	3.45	11.0
Watertown †	59	6	35.6	4.00	3.5
Waukesha †	60	13	36.4	3.24	3.2
Waupaca †	57	4	33.8	2.84	7.5
Wausau †	54	— 4	30.9	3.74	15.0
Westbend	60	16	37.5	3.07	2.0
Wisconsin—Cont'd.					
Westfield †	58	7	34.7	2.25	6.5
Whitehall	59	— 6	35.0	1.40	4.0
White Mound †	62	1	36.0	2.36	4.0
Wyoming.					
Atlantic City	51	—17	18.8	1.55	15.5
Big Horn Ranch	56	—23	21.6	1.28	17.5
Carbon	60	— 5	28.6	0.47	
Embar	58	—11	26.2	1.20	12.0
Fort Laramie †	67	— 5	32.0	0.25	3.8
Fort Washakie	59	—12	26.5	1.42	14.2
Fort Yellowstone †	45	—22	20.8	1.40	14.0
Green River				0.63	6.5
Laramie	52	—10	26.4	0.40	
Lovell *	51	—17	24.1	0.65	9.0
Lusk †	58	—12	22.4	0.92	
Otto	60	—10	25.6	0.05	0.5
Sheridan	60	—20	21.6	1.40	14.0
Sundance	53	—12	23.8	1.20	12.0
Wamsutter	50	— 8	30.2	0.30	3.0
Wheatland	65	0	33.4	0.85	8.5
Mexico.					
Ciudad P. Diaz	91	36	66.4	2.70	
Leon de Aldamas	86	38	65.0	T.	
Topolobampo *1	80	60	67.8	0.00	
West Indies.					
Grand Turk Island				0.61	

Late reports for February, 1898.

Alaska.					
Killisnoo	38	2	21.7	3.80	30.0
California.					
Folsom *b* *1	76	34	53.2	3.90	
Fallbrook *1	84	40	53.9	0.71	
Glendora				1.48	
Guinda				4.45	
Hydesville	63	32	50.1	7.55	
Palermo	70	28	51.3	4.83	
Colorado.					
Meeker	51	—11	24.3	0.34	4.8
Illinois.					
Atwood *a* *3	64	— 4	28.0	2.78	3.0
Olney *a*	69	0	36.4	1.93	5.0
Indiana.					
Topeka				1.98	6.8
Washington				2.06	
Kansas.					
Independence	68	13	40.0	2.64	T.
Scott City	72			0.00	
Louisiana					
Jeanerette				6.01	
Montgomery	75	23	50.8		
Massachusetts.					
Lynn *a*				3.91	
Ludlow				3.95	16.0
Michigan.					
North Manitou Isl'd *10	38	0	24.8		
Mississippi.					
Lake				2.40	
Leakesville	79	21	53.9	3.82	
Mosspoint	72	32	55.6	3.55	
Missouri.					
Halfway	78		37.4		
Montana.					
Kalispell	51	5	30.7	0.32	3.2
Radersburg	58	0	33.6	0.00	
New Jersey.					
Ocean City				2.13	T.
New Mexico.					
Alma	74	20	44.1	0.27	
Monero	53	3	28.6	0.13	1.0
Oregon.					
Happy Valley				0.62	2.8
Weston				0.78	T.
Wyoming.					
Atlantic City	45	—10	21.9	0.05	0.5

CORRECTIONS.

Louisiana, Mansfield, Februry, 1898, make mean temperature 50.6 instead of 50.8.

North Carolina, Newbern, from November, 1896, to February, 1898, inclusive, all records of temperature and precipitation in error, due to faulty exposure of instruments.

New Mexico, Shattucks Ranch, January, 1898, strike out all date and enter 67, 0, 37.5, 0.88, 7.0. February, 1897, strike out all data and enter 73, 10, 42.8, 0.73, 7.0.

NOTE.—The following change has been made in names of stations: Minnesota, Springpark, changed to Deephaven.

Montana, Hogan, changed to Dearborn Canyon.

TABLE III.—*Data furnished by the Canadian Meteorological Service, March*, 1898.

Stations.	Pressure.			Temperature.				Precipitation.			Stations.	Pressure.			Temperature.				Precipitation.		
	Mean not reduced.	Mean reduced.	Departure from normal.	Mean.	Departure from normal.	Mean maximum.	Mean minimum.	Total.	Departure from normal.	Depth of snow.		Mean not reduced.	Mean reduced.	Departure from normal.	Mean.	Departure from normal.	Mean maximum.	Mean minimum.	Total.	Departure from normal.	Depth of snow.
	Ins.	*Ins.*	*Ins.*	°	°	°	°	*Ins.*	*Ins.*			*Ins.*	*Ins.*	*Ins.*	°	°	°	°	°	*Ins.*	
St. Johns, N. F.	29.86	30.01	+.18	31.9	+ 4.2	38.4	25.4	3.25	.....	7.0	Saugeen, Ont.	29.38	30.12	+.10	35.2	+10.5	43.8	26.6	2.67	+0.12	0.4
Sydney, C. B. I.	30.10	30.14	+.27	32.9	+ 6.7	42.1	23.7	3.04	−2.21	12.5	Parry Sound, Ont	29.39	30.11	+.09	33.5	+12.4	44.0	23.1	4.56	+1.94	0.2
Halifax, N. S.	30.08	30.21	+.32	36.6	+ 7.6	45.6	27.6	4.05	−1.81	13.6	Port Arthur, Ont.	29.26	29.98	−.10	24.2	+ 7.4	34.7	13.8	0.87	−0.30	5.4
Grand Manan, N. B.	30.13	30.18	+.28	36.1	+ 6.3	42.5	29.7	3.17	−0.98	3.6	Winnipeg, Man.	29.14	30.02	−.10	16.0	+ 3.7	27.3	4.8	2.56	+1.54	25.3
Yarmouth, N. S.	30.07	30.15	+.27	34.4	+ 3.6	41.6	27.2	2.85	−2.01	9.2	Minnedosa, Man.	28.15	30.06	−.03	15.5	+ 3.0	25.8	5.2	0.74	+0.08	7.4
Charlottet'n, P. E. I.	30.12	30.16	+.28	31.8	+ 6.4	37.8	25.7	2.09	−1.32	10.7	Qu'Appelle, Assin.	27.68	30.09	+.02	10.2	− 4.7	30.2	0.2	1.46	+0.82	14.6
Chatham, N. B.	30.12	30.14	+.24	31.2	+ 8.2	42.4	20.1	1.17	−3.07	5.6	Medicine Hat, Assin.	27.68	30.10	+.07	17.6	− 9.9	37.8	7.3	1.62	+1.01	16.2
Father Point, Que.	30.07	30.10	+.20	27.2	+ 6.9	36.4	17.9	1.20	−1.26	0.5	Swift Current, Assin.	27.38	30.11	+.03	13.4	− 8.6	32.0	4.9	2.02	+1.20	20.2
Quebec, Que.	29.81	30.15	+.20	30.2	+ 9.0	38.0	22.4	2.72	−1.19	3.0	Calgary, Alberta	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Montreal, Que.	29.93	30.15	+.21	34.4	+10.6	41.4	27.4	2.64	−1.05	0.9	Banff, Alberta	25.25	30.09	.....	17.9	.....	30.5	5.3	0.99	.....	9.9
Rockliffe, Ont	29.58	30.11	+.13	32.0	+12.7	44.0	20.1	2.91	+0.62	2.1	Edmonton, Alberta	27.62	30.03	+.05	19.8	− 4.4	30.2	9.3	0.86	+0.21	8.6
Ottawa, Ont	29.81	30.18	.....	33.6	+12.1	42.4	25.0	2.13	.....	T.	Prince Albert, Sask.	28.39	30.01	.....	10.2	− 1.8	22.2	− 1.8	1.10	.....	11.0
Kingston, Ont	29.84	30.16	+.16	36.7	+11.1	44.5	28.9	2.43	−0.63	0.0	Battleford, Sask.	28.25	30.11	.....	11.0	− 2.1	21.8	0.2	0.91	.....	9.1
Toronto, Ont	29.76	30.15	+.12	37.3	+10.0	46.0	28.7	2.40	−0.20	T.	Kamloops, B. C	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
White River, Ont.	28.64	30.06	−.03	20.7	+ 8.5	34.4	7.0	1.93	+0.78	14.8	Esquimalt, B. C	30.04	30.07	.....	41.7	− 0.4	49.0	34.4	1.67	.....	0.2
Port Stanley, Ont	29.48	30.14	+.11	35.2	+ 8.0	43.2	27.4	3.76	+0.81	0.2	Hamilton, Bermuda.	29.98	30.14	+.06	63.4	+ 1.2	67.9	58.9	0.94	.....	

TABLE IV.—*Mean temperature for each hour of seventy-fifth meridian time, March*, 1898.

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midnight.	Mean.
Bismarck, N Dak.	20.7	19.9	19.0	18.4	17.5	16.8	16.3	16.2	16.5	18.3	20.9	23.6	26.0	28.0	29.5	30.5	31.0	30.7	29.5	27.8	25.5	23.9	22.6	21.7	23.0
Boston, Mass.	39.5	38.7	38.4	37.9	37.5	37.5	38.3	39.8	41.4	42.8	44.5	45.5	46.4	47.0	47.6	47.3	46.4	45.4	44.0	42.7	42.2	41.6	40.9	40.4	42.4
Buffalo, N. Y.	39.0	38.7	38.3	37.9	37.7	37.7	37.9	38.5	39.8	40.5	42.0	43.4	44.0	44.3	44.2	44.6	43.7	42.9	42.1	41.5	40.6	40.0	39.7	39.5	40.8
Chicago, Ill.	38.4	37.8	37.5	37.4	37.0	36.8	36.6	37.4	38.1	39.4	40.5	41.7	42.2	42.9	43.4	43.8	43.4	43.2	42.4	41.5	41.0	40.8	40.1	39.4	40.1
Cincinnati, Ohio.	47.5	47.0	46.1	45.7	44.9	44.2	42.9	43.3	43.8	44.6	46.3	48.0	49.6	51.2	52.2	53.1	53.8	53.4	52.3	51.4	50.6	50.0	49.1	48.5	48.3
Cleveland, Ohio	41.9	41.5	40.3	39.7	39.1	38.8	38.6	38.7	39.3	39.9	41.7	43.4	44.5	45.1	45.5	45.6	45.4	45.1	44.6	45.1	44.5	43.8	43.3	42.6	42.4
Detroit, Mich.	37.4	37.0	36.5	36.2	35.6	35.3	34.5	35.2	36.2	37.6	39.9	41.2	42.5	43.8	44.5	44.7	44.6	44.3	43.0	42.1	40.8	39.7	39.2	38.3	39.6
Dodge City, Kans.	36.4	35.8	35.1	34.5	33.5	32.9	32.1	31.4	32.4	36.3	40.5	43.9	47.1	49.7	51.4	53.0	54.1	54.2	52.6	49.2	45.6	43.3	40.5	38.5	41.8
Eastport, Me.	33.1	32.5	31.9	31.5	31.3	31.0	30.9	31.3	32.3	33.5	35.0	36.4	37.3	38.1	38.6	38.8	38.4	37.7	36.8	35.9	35.1	34.6	34.0	33.4	34.6
Galveston, Tex.	62.0	61.7	61.3	61.2	60.6	60.4	60.1	60.1	60.2	60.4	61.0	61.8	62.8	63.4	63.9	63.8	64.0	63.8	63.4	63.0	62.7	62.4	62.2	62.1	62.0
Havre, Mont.	17.8	17.2	16.6	16.7	16.5	16.4	16.0	15.4	14.4	14.4	15.6	16.7	18.7	20.2	21.4	22.7	23.5	23.7	23.7	22.7	21.1	20.0	18.7	17.8	18.6
Kansas City, Mo.	43.4	42.7	41.2	40.1	39.2	38.4	38.1	37.5	38.0	39.4	41.5	44.3	46.4	47.9	48.8	49.5	50.0	49.8	48.8	47.5	46.3	45.2	44.7	44.0	43.9
Key West, Fla.	71.2	70.9	70.7	70.6	70.6	70.6	70.7	71.9	73.2	74.2	75.5	75.9	75.8	76.2	75.7	75.5	74.9	74.0	73.1	72.9	72.6	72.4	72.1	71.8	73.0
Memphis, Tenn.	54.7	53.9	53.2	52.5	51.5	50.9	50.5	50.0	50.2	51.5	53.4	55.8	57.9	59.7	61.5	62.5	63.2	62.9	61.9	60.6	59.3	58.4	57.4	56.1	56.3
New Orleans, La.	61.6	61.1	60.9	60.6	60.4	60.1	59.7	60.2	61.8	64.0	66.7	68.8	69.8	70.0	69.9	69.9	69.2	68.1	66.5	65.1	63.9	62.9	62.3	61.7	64.4
New York, N. Y.	41.1	40.6	40.1	39.6	38.9	38.5	38.4	39.1	40.2	42.0	43.5	45.0	46.4	48.1	48.1	47.8	46.7	45.8	44.8	44.4	43.5	43.2	42.5	42.1	42.9
Philadelphia, Pa.	43.6	42.5	42.3	41.8	41.4	41.0	41.2	42.5	43.8	45.5	47.2	49.6	52.1	53.6	54.9	55.0	54.3	52.6	50.1	48.7	47.2	46.4	45.3	44.5	47.0
Pittsburg, Pa.	44.7	44.2	43.7	43.0	42.6	42.4	41.9	42.3	42.8	44.5	47.3	49.5	51.3	52.8	53.4	53.9	53.6	52.9	51.7	50.4	48.6	47.3	46.4	45.5	47.4
Portland, Oreg.	42.9	42.3	41.4	40.3	39.4	38.8	38.4	38.6	37.9	37.3	37.6	39.2	41.4	43.6	45.4	47.0	48.5	49.6	50.0	49.2	46.8	47.0	45.5	44.4	43.1
St. Louis, Mo.	45.0	44.5	43.9	43.4	42.8	42.4	42.3	42.6	43.5	45.2	47.0	49.3	50.8	51.8	51.5	52.5	52.7	52.2	51.1	49.8	48.5	47.6	46.7	45.8	47.2
St. Paul, Minn.	32.3	31.9	31.2	30.3	29.6	29.1	28.3	27.7	27.9	29.4	31.8	34.1	36.3	37.9	39.3	40.2	40.7	40.5	39.4	38.0	36.6	35.5	34.2	33.2	34.0
Salt Lake City, Utah.	34.3	33.5	32.6	31.7	31.5	31.0	30.8	30.7	30.4	31.1	33.3	35.8	37.4	38.5	39.3	41.0	41.7	42.4	42.0	41.6	39.5	37.7	36.4	35.3	35.8
San Diego, Cal.	53.1	52.0	51.0	50.5	49.9	49.4	49.1	48.9	48.8	49.0	52.0	54.9	57.5	58.8	60.1	60.4	60.4	59.8	59.3	58.5	57.2	56.1	54.9	53.9	54.4
San Francisco, Cal.	50.1	49.6	49.1	48.4	47.9	47.8	47.4	47.1	46.5	46.2	46.9	48.4	50.6	52.5	54.4	54.8	55.4	54.8	54.5	54.0	52.9	51.5	50.6	50.2	50.5
Savannah, Ga.	59.1	58.6	58.0	57.5	57.0	56.5	56.3	57.6	60.6	64.4	67.3	69.4	70.4	71.3	70.8	69.8	68.2	65.8	63.7	62.1	61.3	60.8	60.3	59.9	62.8
Washington, D. C.	45.3	44.7	43.9	43.5	43.2	42.6	42.5	44.1	46.0	47.8	49.9	51.6	53.2	54.7	55.1	55.5	54.9	53.9	52.1	50.7	49.3	47.9	47.1	46.4	48.6

TABLE V.—*Mean pressure for each hour of seventy-fifth meridian time, March*, 1898.

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midnight.	Mean.
Bismarck, N. Dak.	28.218	.217	.215	.212	.202	.205	.200	.205	.205	.207	.212	.214	.211	.203	.191	.186	.185	.188	.195	.201	.210	.217	.225	.231	.207
Boston, Mass.	30.083	.072	.068	.071	.077	.083	.089	.094	.100	.099	.093	.082	.067	.061	.055	.054	.057	.063	.075	.080	.085	.089	.087	.085	.078
Buffalo, N. Y.	29.292	.289	.285	.283	.290	.296	.300	.314	.330	.323	.321	.318	.310	.298	.292	.290	.288	.293	.298	.299	.302	.302	.303	.303	.301
Chicago, Ill.	29.192	.192	.190	.187	.189	.196	.210	.216	.221	.225	.223	.224	.218	.207	.189	.182	.180	.183	.182	.185	.195	.198	.196	.200	.199
Cincinnati, Ohio	29.449	.450	.446	.444	.448	.457	.473	.485	.495	.506	.509	.503	.489	.473	.459	.453	.448	.447	.451	.453	.459	.462	.463	.463	.466
Cleveland, Ohio	29.282	.281	.281	.281	.288	.297	.306	.310	.320	.326	.327	.323	.311	.299	.291	.285	.286	.290	.297	.300	.302	.300	.299	.295	.299
Detroit, Mich.	29.316	.315	.311	.307	.309	.315	.324	.336	.345	.347	.345	.342	.336	.326	.315	.312	.308	.309	.313	.320	.324	.325	.330	.330	.324
Dodge City, Kans.	27.361	.365	.369	.370	.367	.367	.377	.382	.392	.396	.396	.392	.377	.360	.336	.319	.312	.306	.307	.318	.329	.340	.356	.361	.357
Eastport, Me.	30.094	.091	.085	.087	.091	.096	.104	.114	.116	.114	.106	.098	.086	.074	.065	.064	.066	.071	.079	.081	.085	.084	.082	.080	.088
Galveston, Tex.	29.997	.994	.986	.981	.981	.988	.998	.007	.019	.025	.030	.031	.021	.005	.989	.977	.968	.966	.970	.976	.985	.996	.004	.005	.996
Havre, Mont.	27.345	.344	.342	.340	.334	.330	.328	.326	.331	.334	.335	.338	.338	.338	.334	.329	.326	.325	.328	.329	.337	.344	.351	.355	.336
Kansas City, Mo.	29.033	.038	.039	.035	.036	.044	.055	.060	.075	.081	.084	.079	.068	.048	.029	.018	.012	.013	.014	.016	.027	.040	.047	.047	.043
Key West, Fla.	30.108	.094	.081	.077	.082	.091	.105	.118	.129	.136	.137	.127	.110	.094	.081	.075	.075	.080	.090	.102	.116	.127	.126	.121	.104
Memphis, Tenn.	29.665	.670	.670	.668	.668	.677	.691	.698	.710	.719	.725	.722	.705	.688	.663	.651	.640	.637	.640	.645	.648	.656	.667	.669	.675
New Orleans, La.	30.044	.034	.027	.021	.026	.036	.048	.061	.072	.077	.078	.072	.057	.040	.029	.025	.025	.029	.035	.043	.052	.060	.060	.055	.046
New York, N. Y.	29.872	.870	.862	.860	.865	.872	.881	.890	.893	.893	.887	.882	.864	.851	.845	.845	.854	.856	.863	.872	.879	.883	.884	.882	.871
Philadelphia, Pa.	30.095	.095	.088	.089	.096	.103	.109	.120	.125	.123	.115	.107	.090	.074	.064	.062	.065	.072	.083	.091	.102	.105	.106	.105	.094
Pittsburg, Pa.	29.246	.245	.241	.238	.243	.252	.262	.274	.281	.282	.279	.274	.263	.246	.234	.227	.228	.231	.237	.248	.255	.263	.261	.260	.253
Portland, Oreg.	29.960	.962	.963	.962	.963	.962	.958	.961	.963	.969	.974	.982	.984	.982	.975	.966	.952	.940	.932	.925	.926	.931	.941	.946	.957
St. Louis, Mo.	29.489	.489	.487	.483	.488	.493	.503	.514	.523	.527	.525	.519	.509	.490	.474	.467	.461	.459	.461	.468	.482	.487	.496	.495	.491
St. Paul, Minn.	29.082	.086	.088	.085	.084	.087	.095	.099	.105	.110	.112	.111	.103	.093	.077	.067	.063	.066	.067	.074	.077	.085	.092	.098	.088
Salt Lake City, Utah	25.582	.586	.586	.589	.584	.578	.580	.586	.595	.603	.612	.617	.619	.616	.605	.591	.583	.579	.571	.569	.568	.574	.574	.579	.589
San Diego, Cal.	29.940	.942	.941	.939	.931	.922	.916	.921	.928	.937	.951	.962	.964	.958	.946	.932	.917	.908	.905	.905	.910	.916	.930	.936	.932
San Francisco, Cal.	29.936	.938	.942	.945	.942	.932	.932	.935	.943	.950	.961	.969	.971	.967	.954	.938	.922	.913	.903	.898	.897	.905	.918	.927	.935
Savannah, Ga.	30.078	.073	.067	.065	.073	.084	.098	.109	.119	.120	.119	.110	.092	.072	.057	.053	.055	.062	.065	.075	.082	.086	.089	.086	.083
Washington, D. C.	30.097	.097	.092	.090	.100	.109	.120	.128	.134	.135	.129	.118	.102	.082	.073	.069	.069	.074	.080	.091	.094	.100	.102	.103	.099

TABLE VI.—*Average wind movement for each hour of seventy-fifth meridian time, March*, 1898.

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midnight.	Mean.
Abilene, Tex.	10.7	11.0	10.5	10.1	10.2	10.1	9.4	9.6	9.8	11.2	12.7	13.5	13.8	13.0	13.4	13.0	12.8	13.1	13.3	12.1	10.1	9.9	10.5	10.3	11.4
Albany, N. Y.	8.0	8.2	7.7	8.0	8.1	7.7	7.9	8.5	9.6	10.3	10.6	11.1	12.1	12.0	11.5	11.3	10.8	9.2	7.5	7.3	7.2	7.6	7.5	7.6	9.1
Alpena, Mich.	8.5	8.9	9.5	9.5	9.4	9.3	9.0	9.2	9.6	10.2	9.6	10.5	11.0	11.5	11.5	11.9	12.1	12.0	10.5	9.6	8.4	8.6	8.5	9.0	9.9
Amarillo, Tex.	17.0	17.2	17.3	17.9	19.1	18.3	18.3	16.6	15.5	16.2	18.7	18.8	19.5	20.5	21.1	21.8	22.5	22.7	22.5	19.2	16.8	17.5	18.4	17.7	18.8
Atlanta, Ga.	9.7	9.9	9.5	9.0	9.4	8.9	9.1	8.9	9.1	9.4	10.2	10.2	10.4	9.7	10.0	10.2	10.3	9.9	9.0	9.0	9.5	10.2	10.2	10.6	9.7
Atlantic City, N. J.	9.5	9.9	10.1	10.3	10.3	10.4	11.3	11.6	12.4	12.7	12.8	12.7	13.3	13.4	13.1	12.6	12.9	11.2	10.4	10.3	9.7	9.5	9.3	9.2	11.2
Augusta, Ga.	5.2	5.0	5.5	5.2	5.0	5.0	4.7	5.5	6.0	7.7	8.7	9.1	9.5	9.6	9.5	9.0	8.5	7.8	6.5	6.2	6.0	6.0	5.8	5.2	6.8
Baker City, Oreg.	5.0	5.5	5.4	6.4	6.2	6.4	5 8	5.6	5.4	5.3	5.2	6.0	6.3	7.2	7.4	8.0	8.1	8.3	8.1	8.2	7.1	5.2	5.0	5.2	6.3
Baltimore, Md.	4.9	5.1	4.9	4.9	5.0	5.2	5.3	5.8	6.9	7.0	6.5	7.1	7.1	6.8	6.6	6.7	6.6	5.4	4.8	4.9	4.8	4.7	4.6	4.5	5.7
Bismarck, N. Dak.	10.2	9.3	9.0	8.6	8.6	8.1	7.8	7.1	7.5	9.3	10.9	11.1	12.2	12.6	14.0	14.3	14.4	14.4	13.5	11.4	10.6	10.1	10.2	10.5	10.7
Block Island, R. I.	11.7	12.5	11.9	12.3	12.5	12.2	12.8	13.3	13.6	13.5	13.8	13.6	13.3	14.5	14.1	14.1	13.0	11.2	11.5	12.1	12.0	11.8	12.1	12.1	12.7
Boston, Mass.	8.5	8.1	8.0	7.3	7.6	8.5	8.4	8.7	9.7	10.6	10.7	11.3	12.0	12.6	12.2	12.4	12.2	10.9	10.7	10.1	9.8	9.1	9.3	8.3	9.9
Buffalo, N. Y.	14.7	14.3	14.3	13.3	13.7	13.5	13.3	13.4	14.0	14.6	14.9	15.3	16.1	16.6	15.9	14.8	15.4	14.3	13.7	14.5	14.7	14.6	14.0	14.1	14.5
Cairo, Ill.	9.7	9.5	10.3	10.9	11.3	10.5	10.5	10.4	11.3	11.4	12.2	11.9	12.3	12.6	12.0	11.7	11.9	11.6	10.4	10.0	9.7	9.2	10.1	10.0	10.9
Cape Henry, Va.	11.9	12.0	12.6	13.0	13.5	13.7	14.1	14.5	14.8	14.4	14.5	14.5	14.9	13.9	13.9	13.6	12.7	11.9	11.7	12.1	12.0	11.7	11.1	10.9	13.1
Carson City, Nev.	6.5	5.9	6.4	5.8	5.7	5.4	4.5	4.6	4.1	3.5	4.3	5.4	7.4	8.5	8.5	9.6	10.8	11.7	11.8	11.7	10.9	9.7	7.8	7.0	7.4
Charleston, S. C.	9.7	9.5	10.2	10.6	10.2	9.5	9.5	10.1	10.3	11.0	12.4	12.9	14.1	14.5	14.9	14.9	14.7	13.8	12.5	11.4	10.7	10.5	10.6	10.3	11.6
Charlotte, N. C.	6.8	6.9	7.7	7.2	7.1	7.7	8.0	8.4	9.5	9.7	10.2	10.5	11.0	10.5	10.1	9.5	8.7	7.7	6.5	6.4	7.5	7.7	8.0	7.4	8.4
Chattanooga, Tenn.	7.6	8.5	8.6	8.0	8.2	7.8	7.9	8.2	9.0	9.8	10.3	9.7	10.1	9.7	9.7	10.7	11.8	11.1	9.2	7.6	6.6	6.5	6.9	6.9	8.8
Cheyenne, Wyo.	8.4	7.7	8.6	8.8	9.4	9.0	8.7	9.0	8.8	10.1	13.0	13.8	14.6	15.1	15.9	16.7	17.2	16.3	14.3	14.0	11.1	10.0	9.1	8.4	11.6
Chicago, Ill.	16.9	16.5	16.4	16.2	16.3	15.7	16.4	15.9	17.3	17.6	18.4	18.6	19.5	18.8	18.6	18.4	18.1	18.5	18.3	17.8	17.5	17.6	17.9	17.6	17.5
Cincinnati, Ohio.	6.6	5.8	6.5	6.5	7.1	7.1	7.8	7.6	8.3	8.7	9.3	9.4	10.0	10.0	9.4	9.1	8.7	8.3	7.4	6.4	6.1	6.1	6.3	6.4	7.7
Cleveland, Ohio.	14.1	14.6	14.6	14.6	14.3	14.5	14.7	15.2	15.2	15.2	14.9	13.9	14.3	14.1	14.0	14.5	13.7	13.0	11.9	12.6	12.7	13.1	13.7	13.9	14.1
Columbia, Mo.	9.5	8.2	8.3	7.7	7.9	7.5	8.0	7.9	8.2	9.5	10.1	10.4	10.5	11.4	11.7	11.1	11.8	11.4	10.2	9.0	9.6	10.6	10.7	9.6	9.6
Columbus, Ohio.	7.0	6.6	6.4	7.3	7.5	7.5	7.6	8.1	9.0	9.1	9.5	9.3	9.2	8.9	9.1	9.1	8.6	7.6	7.6	7.0	7.1	6.9	6.9	6.2	7.9
Concordia, Kans.	8.6	8.0	7.5	7.2	8.2	8.1	7.8	7.2	7.8	9.2	10.5	10.8	11.0	11.9	11.9	12.2	11.9	11.1	9.6	7.1	7.4	8.6	9.1	9.2	9.2
Corpus Christi, Tex.	15.2	15.3	14.8	14.4	14.4	13.1	12.8	13.0	12.6	13.8	15.1	16.2	16.7	16.8	17.7	18.1	17.8	17.4	17.1	17.0	15.4	14.9	15.0	14.4	15.4
Davenport, Iowa.	6.8	6.6	6.1	5.6	5.5	5.4	5.2	5.6	6.4	7.4	8.2	8.7	9.9	10.2	10.1	10.2	9.5	9.3	8.3	7.3	7.2	7.2	7.1	7.1	7.5
Denver, Colo.	7.3	7.2	7.5	7.5	7.5	6.5	6.4	6.4	6.5	7.0	7.5	8.5	9.3	10.1	11.6	11.8	12.5	13.7	14.3	13.0	11.9	10.4	8.7	8.2	9.2
Des Moines, Iowa.	7.3	7.1	6.6	6.2	6.1	6.2	6.7	6.8	7.6	9.1	10.4	11.2	12.5	12.9	13.0	13.1	13.1	12.5	10.6	9.4	8.4	8.5	8.7	8.1	9.2
Detroit, Mich.	8.0	8.0	8.5	8.9	8.6	8.5	8.7	8.9	9.6	10.1	10.5	10.8	11.4	12.0	11.5	11.5	11.0	9.9	9.1	9.3	9.3	9.1	8.4	8.5	9.6
Dodge City, Kans.	11.8	11.9	12.3	12.0	11.4	11.2	10.5	10.1	10.4	11.7	15.1	14.8	15.0	16.0	16.5	16.5	17.6	17.5	16.5	14.2	11.7	11.4	11.7	12.0	13.3
Dubuque, Iowa.	7.0	6.9	6.4	6.5	6.5	5.7	5.2	5.0	6.0	7.0	8.5	8.9	9.7	10.1	10.7	10.9	10.8	10.2	8.9	7.8	7.3	7.1	7.3	6.8	7.8
Duluth, Minn.	11.3	11.8	12.1	12.4	12.7	13.1	13.0	12.8	11.6	11.3	12.1	12.5	13.6	14.2	15.0	14.3	13.0	12.6	11.5	10.8	9.8	10.5	10.7	10.8	12.2
Eastport, Me.	9.0	8.4	8.2	7.9	8.3	9.0	9.7	9.8	9.3	9.2	9.1	9.5	10.7	12.2	11.5	11.1	11.5	9.7	9.3	9.2	10.1	10.4	10.5	10.3	9.7
El Paso, Tex.	11.9	12.5	11.7	11.0	10.4	9.8	10.0	9.6	10.1	10.4	11.2	12.4	12.6	13.8	14.6	17.8	19.0	18.8	18.9	16.4	15.7	13.7	13.2	12.0	13.2
Erie Pa.	13.1	13.2	12.4	12.1	12.6	12.6	12.5	12.8	13.2	13.1	13 6	13.1	13.0	12.5	12.3	12.0	11.2	10.6	10.4	10.3	10.8	11.0	11.5	12.4	12.2
Eureka, Cal.	5.5	4.9	4.4	3.8	4.0	4.1	3.4	3.5	3.4	3.0	3.0	3.3	4.3	6.2	8.5	10.5	11.9	13.2	13.9	14.2	13.8	12.9	10.3	7.6	7.2
Fort Canby, Wash.	10.5	10.5	9.5	9.5	10.3	10.3	10.5	10.4	10.1	9.8	10.6	10.6	10.9	10.9	10.8	10.3	11.7	11.3	10.7	10.4	10.4	10.5	11.0	10.8	10.5
Fort Smith, Ark.	7.3	6.7	6.6	6.5	6.2	6.5	6.2	6.6	6.7	7.8	8.5	8.0	8.6	8.5	8.9	9.0	8.5	8.4	7.6	6.7	6.8	6.2	6.0	6.5	7.3
Fresno, Cal.	5.9	6.4	5.8	5.2	4.6	4.3	4.0	4.3	3.8	3.8	3.7	4.5	5.1	5.5	5.5	6.2	5.9	6.0	6.3	6.1	5.1	4.4	4.8	5.0	5.1
Galveston, Tex.	13.4	13.4	13.1	13.5	13.1	12.9	12.9	13.7	14.0	13.7	14.5	14.3	14.6	14.4	13.7	13.3	13.4	13.3	12.6	12.7	12.6	12.8	13.3	13.3	13.4
Grand Haven, Mich.	9.7	10.0	9.8	9.7	9.5	9.2	9.2	9.5	10.4	11.2	11.4	12.3	12.8	12.4	11.9	11.9	10.8	10.0	9.7	8.8	9.2	10.3	10.5	9.9	10.4
Greenbay, Wis.	8.0	8.8	8.8	8.5	8.5	8.4	7.8	7.5	8.8	8.9	9.3	9.9	10.5	11.2	11.2	11.1	10.5	10.0	9.3	8.8	8.0	8.0	8.3	7.9	9.1
Hannibal, Mo.	8.9	8.6	7.8	7.8	7.6	6.7	6.5	7.8	8.5	9.8	11.1	11.0	12.1	12.2	12.0	12.5	12.1	12.2	11.2	10.4	10.0	10.4	10.4	9.8	9.9
Harrisburg, Pa.	7.1	7.6	7.0	6.7	7.0	6.6	6.3	6.8	7.6	7.9	7.9	8.1	9.2	9.5	9.9	9.5	9.3	8.6	7.6	7.5	6.8	6.9	6.7	6.8	7.7
Hatteras, N. C.	13.4	13.5	13.9	14.3	14.4	14.1	13.7	14.3	14.9	15.6	15.5	15.5	15.4	16.1	15.8	15.5	14.9	13.4	12.5	12.8	13.0	13.1	13.3	12.7	14.2
Havre, Mont.	10.5	10.6	11.5	11.8	11.3	10.2	10.0	8.6	9.8	9.4	9.9	10.9	12.3	13.1	13.3	13.2	13.5	13.5	13.0	12.2	11.3	10.7	9.9	9.6	11.3
Helena, Mont.	7.1	7.5	6.8	6.3	6.8	6.9	7.2	6.7	6.5	6.3	5.9	6.3	7.2	7.5	8.0	9.0	9.0	8.5	8.0	5.9	6.5	6.5	5.9	6.1	7.0
Huron, S. Dak.	12.6	13.0	12.7	12.5	12.3	12.3	12.5	12.6	12.2	12.9	13.9	14.6	15.0	15.5	15.3	16.0	16.3	15.3	14.2	11.8	11.8	12.1	12.3	12.3	13.4
Idaho Falls, Idaho.	11.0	11.1	11.0	11.1	10.2	9.4	9.0	9.7	9.4	9.9	10.8	12.5	12.3	12.7	12.8	13.7	14.8	15.0	15.5	14.6	11.8	11.5	12.0	11.3	11.8
Indianapolis, Ind.	9.8	10.2	10.1	10.7	10.8	10.8	10.6	10.0	10.1	10.5	11.5	11.9	12.1	12.5	12.6	12.1	11.9	11.7	11.1	9.7	9.4	10.3	10.4	10.4	10.9
Jacksonville, Fla.	7.1	7.0	6.5	5.9	6.0	5.7	5.5	6.0	7.5	8.7	8.9	9.5	10.4	10.5	10.8	10.5	11.1	11.2	10.0	8.4	7.9	7.6	7.4	7.5	8.2
Jupiter, Fla.	10.0	10.1	10.2	10.0	9.7	9.1	8.9	9.5	10.7	11.5	12.5	12.4	11.9	12.2	12.6	12.7	12.4	12.1	10.3	10.1	10.1	9.9	9.9	10.0	10.8
Kansas City, Mo.	8.1	8.0	8.0	8.2	7.3	7.3	7.3	7.2	8.7	9.6	9.8	10.2	11.4	11.3	11.2	11.5	11.0	10.3	9.6	8.6	8.4	8.0	7.9	8.1	9.0
Keokuk, Iowa.	7.6	7.3	7.4	7.1	6.4	6.0	6.3	6.4	7.2	8.8	9.2	10.1	10.0	10.4	9.8	9.9	10.3	9.8	8.9	7.5	7.6	8.0	7.9	7.6	8.2
Key West, Fla.	10.9	10.5	10.1	9.9	9.4	9.5	9.6	9.9	10.8	11.8	11.9	12.8	13.0	12.9	13.0	12.3	11.9	11.4	11.2	10.9	10.5	10.4	10.0	10.0	11.0
Kittyhawk, N. C.	13.0	13.1	13.4	12.6	13.5	14.2	14.8	13.7	16.0	16.6	17.0	16.8	16.5	16.8	17.2	16.2	16.0	15.3	13.8	13.2	13.0	12.9	11.9	11.9	14.6
Knoxville, Tenn.	6.5	7.1	7.5	8.5	9.1	9.2	9.5	8.1	8.4	8.5	9.9	10.0	10.4	10.3	10.7	11.2	11.8	10.6	10.2	8.7	7.6	7.7	7.5	7.0	9.0
La Crosse, Wis.	7.2	7.0	7.1	7.2	7.0	7.0	7.1	7.0	7.8	8.8	9.5	9.7	10.5	10.6	10.9	11.0	10.5	10.0	8.8	8.1	7.5	7.3	7.1	7.0	8.4
Lander, Wyo.	4.6	4.9	4.8	4.7	4.4	4.2	4.7	4.1	3.8	3.5	3.5	3.7	4.2	4.9	5.6	6.9	6.7	6.6	6.3	6.2	6.0	5.0	4.6	4.1	4.9
Lexington Ky.	11.4	11.4	11.3	11.0	11.6	11.6	12.0	12.8	12.8	14.0	14.1	13.8	13.8	13.2	12.7	12.6	12.0	11.3	9.8	9.8	10.0	10.8	11.7	11.5	12.0
Little Rock, Ark.	7.7	7.9	7.7	8.4	8.5	8.1	7.3	7.9	8.3	10.6	11.6	11.3	11.9	11.5	11.5	10.5	10.3	10.1	9.1	8.2	8.3	8.5	8.5	8.1	9.2
Los Angeles, Cal.	2.9	3.2	3.4	3.6	3.3	3.0	3.1	3.5	3.5	3.8	4.3	4.6	4.6	4.9	6.2	7.7	9.2	9.7	9.4	8.5	6.9	4.8	4.1	3.1	5.1
Louisville, Ky.	7.8	7.4	7.0	7.3	8.8	8.8	8.8	9.2	9.4	10.0	11.0	10.8	11.6	10.6	10.8	10.0	9.9	9.3	8.1	7.9	8.3	8.5	8.7	8.2	9.1
Lynchburg, Va.	2.6	2.8	2.8	2.6	3.2	3.3	3.0	3.8	4.5	5.2	6.0	6.0	6.0	5.7	5.3	5.4	5.2	5.2	3.9	3.1	2.8	3.1	3.1	3.2	4.1
Marquette, Mich.	10.5	10.6	10.3	10.0	10.4	10.2	10.3	11.0	12.2	12.9	13.5	13.5	14.5	14.8	14.6	14.0	13.2	12.8	11.5	10.3	9.9	10.5	10.7	10.6	11.8
Memphis, Tenn.	12.4	12.7	12.4	12.3	12.4	12.1	13.0	12.0	12.5	13.2	13.3	13.3	13.4	13.3	13.5	12.8	12.5	11.8	10.2	9.9	10.3	11.0	11.1	12.4	12.2
Milwaukee, Wis.	9.2	9.3	9.6	9.7	9.0	9.0	8.1	8.5	8.7	9.2	9.9	10.5	11.5	11.9	12.1	11.5	11.3	10.5	9.8	10.1	9.8	9.6	9.4	9.5	9.9
Mobile, Ala.	9.1	8.5	8.6	7.5	7.6	7.4	7.3	6.9	7.3	8.4	9.3	10.0	11.8	12.8	13.2	13.6	13.7	13.0	11.6	10.9	10.5	9.9	9.3	9.1	9.9
Montgomery, Ala.	6.4	6.1	6.4	6.0	6.0	5.6	5.3	5.2	6.5	7.8	8.6	8.8	9.2	9.5	9.5	9.8	9.6	9.6	7.7	7.4	7.8	7.6	7.2	6.6	7.5
Moorhead, Minn.	12.0	12.1	11.7	11.5	12.2	11.7	11.5	11.6	11.2	12.7	13.5	13.9	14.3	13.5	13.7	13.4	14.0	14.2	13.5	11.9	11.5	11.8	12.2	11.8	12.5
Nantucket, Mass.	9.3	9.4	9.5	9.7	10.1	10.4	9.9	10.8	11.9	13.2	13.7	13.5	13.6	13.2	12.5	12.3	12.3	11.2	10.4	10.3	9.9	10.2	10.4	10.1	11.2
Nashville, Tenn.	8.5	8.7	8.4	8.3	7.8	8.4	7.6	7.8	8.7	10.1	10.5	10.2	11.0	11.3	11.9	12.1	11.8	10.7	9.4	8.1	8.2	7.7	7.9	7.8	9.3
New Haven, Conn.	5.8	6.0	5.6	5.8	6.2	6.1	6.7	7.1	8.4	9.1	9.9	9.9	10.7	12.2	11.6	11.4	10.7	8.9	8.7	7.6	7.5	6.9	5.9	6.0	8.1
New Orleans, La.	9.7	9.2	9.0	9.1	8.8	8.6	8.1	7.9	8.7	11.0	12.0	12.7	13.1	13.7	13.6	14.0	13.7	13.1	12.4	10.8	10.4	9.9	10.1	10.1	10.8
New York, N. Y.	9.4	9.3	9.2	9.6	9.7	9.8	10.4	10.8	10.6	10.7	10.7	11.1	11.5	12.2	13.5	13.1	12.9	12.9	12.7	11.7	11.5	11.1	10.8	10.0	11.1
Norfolk, Va.	7.0	7.1	7.0	7.3	7.1	6.9	7.9	8.2	8.8	9.3	9.5	9.6	9.9	9.9	9.5	9.5	9.0	8.0	7.5	7.0	6.9	6.3	6.2	6.5	8.0
Northfield, Vt.	7.9	8.7	8.7	7.6	8.0	8.2	8.1	8.2	9.0	9.4	11.0	11.6	12.0	13.3	13.8	13.5	11.7	11.0	9.8	9.1	9.4	9.7	8.4	8.2	9.8
North Platte, Nebr.	10.4	10.6	9.6	9.9	9.6	8.9	8.9	8.9	8.9	10.1	10.9	11.3	11.4	12.6	13.3	13.9	14.1	13.7	11.9	9.9	9.5	10.0	9.3	9.6	10.7
Oklahoma, Okla.	11.5	11.3	11.9	12.4	12.3	12.6	12.0	11.9	11.9	13.4	15.6	16.3	16.4	16.3	16.2	15.1	14.9	14.5	13.1	11.2	9.9	10.7	10.6	11.3	13.0
Omaha, Nebr.	8.2	8.1	7.3	7.2	7.9	8.2	8.2	7.6	8.1	8.8	9.8	10.4	11.3	12.0	12.3	12.0	12.0	11.1	9.5	8.4	7.7	8.0	8.4	8.6	9.2
Oswego, N. Y.	12.1	12.1	11.9	11.2	11.6	11.5	11.9	12.7	12.3	12.9	13.3	13.5	14.4	14.4	14.2	14.4	13.1	12.0	11.0	11.2	11.6	11.6	12.2	12.5	12.4
Palestine, Tex.	8.5	8.5	8.4	8.2	8.0	7.6	7.6	8.1	8.4	10.4	11.4	11.5	11.5	10.9	10 6	10.6	10.6	9.9	9.1	8.0	7.7	8.0	8.0	8.2	9.2
Parkersburg, W. Va.	5.4	4.6	4.5	4.7	4.5	4.6	4.4	4.8	6.1	6.7	7.7	7.9	8.5	8.2	7.7	7.2	7.7	6.7	5.5	5.2	5.1	4.7	4.7	4.9	5.9

TABLE VI.—*Average wind movement, etc.*—Continued.

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midnight.	Mean.
Pensacola, Fla.	9.2	9.7	9.1	9.4	9.2	8.8	7.8	7.9	8.4	8.7	8.7	9.0	10.1	10.6	10.8	10.8	10.4	10.2	9.4	8.9	8.8	9.0	9.3	9.5	9.3
Philadelphia, Pa.	8.8	9.3	9.2	9.2	9.2	8.6	9.1	10.2	10.5	10.9	11.0	10.5	10.6	10.5	10.7	11.6	11.0	10.4	10.5	10.2	9.8	9.0	9.0	8.6	9.9
Phœnix, Ariz.	3.7	3.8	3.9	4.2	4.1	4.5	4.3	4.0	3.8	4.1	4.6	5.1	4.8	5.7	5.9	6.5	6.7	7.1	6.4	6.3	4.7	4.6	4.6	3.6	4.9
Pierre, S. Dak.	9.2	9.1	8.6	8.5	9.0	9.0	8.5	8.9	8.5	8.9	11.2	12.6	13.0	13.4	13.6	13.4	13.4	13.0	13.0	11.8	10.7	10.3	10.1	9.2	10.7
Pittsburg, Pa.	6.0	6.1	6.4	6.3	6.0	6.0	6.0	6.0	6.5	7.1	7.8	7.5	8.2	8.1	7.3	7.1	7.3	6.9	6.4	6.3	6.3	5.9	6.3	6.1	6.7
Port Angeles, Wash.	7.3	7.5	7.5	7.4	7.2	6.8	6.6	6.7	6.6	6.7	6.1	5.2	6.0	6.9	8.2	7.7	7.3	6.5	5.8	5.8	5.6	5.8	6.8	6.9	6.7
Port Huron, Mich.	9.4	9.5	9.8	9.9	9.7	10.1	10.3	10.5	11.9	12.2	12.7	12.6	12.9	13.9	13.4	13.7	13.8	12.7	11.5	10.1	10.2	10.5	10.4	9.8	11.3
Portland, Me.	4.7	5.0	5.1	5.4	4.9	5.3	5.5	6.0	6.5	7.0	7.7	8.4	8.9	9.8	9.4	9.7	9.2	8.2	7.3	7.2	6.8	6.2	5.6	5.6	6.9
Portland, Oreg.	8.2	8.6	8.2	7.6	7.4	6.7	6.7	7.5	8.0	7.7	7.9	8.0	8.0	9.8	9.4	9.5	9.9	10.0	10.0	10.5	9.5	8.6	8.7	8.7	8.5
Pueblo, Colo.	7.1	6.4	6.3	6.3	6.1	6.7	6.7	6.0	5.5	5.9	7.5	9.5	9.9	10.1	10.2	11.8	13.5	14.1	13.3	11.9	11.4	10.1	8.3	7.8	8.9
Raleigh, N. C.	5.6	6.4	6.2	6.3	6.2	6.1	6.6	6.9	7.5	8.5	8.8	9.1	9.1	8.8	8.2	8.1	7.6	6.6	5.4	5.6	5.9	5.4	6.0	5.5	6.9
Rapid City, S. Dak.	6.2	6.7	7.0	6.8	6.7	7.1	7.5	7.0	7.0	7.5	8.4	9.7	10.3	10.6	10.5	10.4	10.2	10.7	10.2	9.6	7.7	7.3	6.7	6.4	8.3
Redbluff, Cal.	5.6	5.9	5.5	5.8	6.4	5.9	5.8	5.7	5.9	5.5	6.0	6.7	8.2	8.4	8.6	8.5	8.5	8.7	9.4	9.7	8.0	6.9	6.5	5.7	7.0
Richmond, Va.	6.5	6.9	6.6	6.2	6.5	6.6	7.4	7.4	8.5	9.4	9.3	9.6	9.5	8.6	8.0	8.1	7.8	7.0	6.8	7.0	7.1	6.5	6.6	6.6	7.5
Rochester, N. Y.	7.0	6.9	7.1	7.0	7.1	7.3	7.0	7.7	8.4	9.5	9.7	10.3	11.2	11.1	11.0	10.7	10.0	9.0	8.2	7.8	7.7	7.3	7.6	7.0	8.5
Roseburg, Oreg.	2.1	2.0	2.2	2.3	2.2	2.0	2.3	2.4	2.4	2.4	2.3	2.8	3.5	4.2	4.7	5.4	6.1	6.3	6.5	6.2	6.0	4.4	3.1	2.5	3.6
Sacramento, Cal.	8.4	8.3	7.7	7.9	7.8	8.7	8.8	9.2	8.4	8.6	8.5	9.2	9.8	9.8	10.2	10.9	11.5	12.2	12.5	11.5	9.9	8.9	8.5	8.5	9.4
St. Louis, Mo.	10.0	9.6	9.6	9.5	8.8	8.5	8.4	8.5	9.1	9.7	9.7	10.1	10.2	10.6	10.9	11.1	10.7	11.1	10.4	10.3	10.4	10.2	10.3	9.6	9.9
St. Paul, Minn.	7.3	7.8	8.1	7.6	7.8	7.5	7.9	8.0	8.6	9.4	9.9	10.3	11.2	11.4	11.6	11.3	11.0	10.3	9.6	8.3	7.8	7.7	7.6	7.4	9.0
Salt Lake City, Utah.	5.5	5.4	5.1	5.7	5.2	5.5	4.8	4.7	5.0	5.4	6.3	6.9	9.4	9.7	10.1	9.2	11.1	10.5	9.4	7.9	6.0	5.4	6.0	6.0	6.9
San Antonio, Tex.	10.8	10.6	10.4	10.3	9.8	9.6	10.0	9.4	9.9	11.5	13.1	13.5	13.5	13.5	13.8	13.0	13.2	13.2	14.0	13.1	13.1	12.7	12.6	11.2	11.9
San Diego, Cal.	4.6	5.0	4.2	4.6	5.3	5.3	5.1	5.1	5.0	4.5	4.1	4.8	6.2	8.1	9.6	10.4	11.6	11.4	10.6	9.8	8.0	6.3	5.5	4.7	6.7
Sandusky, Ohio	7.3	7.4	8.3	8.1	8.5	8.9	8.5	8.7	9.0	9.0	8.7	8.6	8.5	9.0	9.1	9.3	9.2	8.1	8.4	8.3	7.7	7.5	7.4	7.5	8.4
San Francisco, Cal.	9.3	7.9	7.8	8.1	7.5	6.8	7.3	8.4	7.8	7.0	7.8	8.3	8.0	9.0	10.9	12.9	15.4	17.4	17.5	16.5	13.9	13.3	11.5	10.0	10.4
San Luis Obispo, Cal.	3.7	3.3	3.0	2.8	3.0	2.8	3.3	3.2	3.4	3.3	3.9	4.2	5.6	6.3	6.9	8.2	9.4	10.1	9.6	9.5	7.6	5.3	3.9	3.7	5.2
Santa Fe, N. Mex.	5.1	4.1	4.0	4.1	4.4	3.8	3.8	3.5	3.5	4.0	6.9	8.5	10.2	10.8	11.1	12.1	12.2	12.1	11.4	10.4	6.9	6.0	6.1	5.5	7.1
Sault Ste Marie, Mich.	8.3	8.3	8.1	8.2	7.6	7.3	8.1	8.1	8.5	8.7	9.1	10.5	11.0	12.5	12.7	13.2	12.7	12.0	10.5	9.6	9.2	9.1	8.8	8.6	9.6
Savannah, Ga.	7.7	7.4	6.8	6.2	5.9	6.7	6.9	7.0	7.5	8.7	9.7	10.5	11.6	11.0	11.4	11.9	12.2	11.1	9.9	9.1	9.2	8.8	8.5	8.3	8.9
Seattle, Wash.	4.8	4.8	4.5	5.1	5.3	5.1	5.2	5.2	5.4	5.2	5.4	5.7	5.8	6.2	6.5	7.1	7.5	7.5	7.6	7.4	7.0	6.4	5.6	5.2	5.9
Shreveport, La.	8.7	8.8	8.9	8.3	8.8	8.9	8.6	8.3	9.0	10.4	10.8	10.6	10.5	11.1	10.6	11.0	10.5	10.5	10.3	9.4	9.3	9.8	9.5	9.4	9.7
Sioux City, Iowa.	13.4	12.9	12.9	13.3	13.1	13.1	13.1	14.1	13.5	14.9	16.1	17.7	20.1	19.8	19.3	19.3	18.3	17.2	15.7	13.4	14.4	13.9	12.7	13.4	15.2
Spokane, Wash.	6.1	5.9	5.7	5.8	5.6	5.4	6.2	5.6	6.0	5.9	6.8	7.0	7.5	7.5	7.5	8.0	8.5	8.5	7.7	7.4	7.1	6.4	7.0	6.7	6.7
Springfield, Ill.	11.0	10.4	9.3	9.6	9.2	8.9	8.5	8.6	9.6	10.4	10.7	11.1	10.8	11.5	11.7	12.2	12.5	12.1	10.7	10.2	10.0	10.3	10.5	10.3	10.4
Springfield, Mo.	11.9	12.0	12.3	11.7	11.2	11.7	12.0	11.9	11.5	12.2	13.1	13.7	13.4	13.2	13.7	13.7	14.1	13.2	12.3	11.3	11.6	12.4	12.5	12.2	12.5
Tacoma, Wash.	5.8	5.9	5.6	5.2	5.9	6.0	5.4	5.5	5.7	6.2	6.6	6.9	6.9	8.2	9.0	9.1	9.3	9.4	9.8	9.6	8.6	8.1	7.4	6.5	7.2
Tampa, Fla.	5.0	5.0	5.0	4.9	4.8	4.9	5.6	5.8	7.2	8.4	7.8	7.0	8.3	8.0	8.4	8.8	9.0	8.3	7.3	5.7	5.5	4.9	4.6	4.1	6.4
Tatoosh Island, Wash.	11.8	13.9	13.1	12.8	13.7	14.0	13.0	13.5	13.9	13.7	13.7	13.3	13.9	16.0	15.5	14.1	14.0	14.0	13.7	14.2	12.8	11.6	11.9	12.1	13.5
Toledo, Ohio.	9.4	9.5	9.5	9.6	10.1	9.6	9.6	9.5	9.9	10.4	10.5	11.2	12.1	12.1	11.9	11.9	11.7	11.3	10.5	9.0	9.5	8.8	7.9	8.4	10.2
Vicksburg, Miss.	9.0	8.9	8.6	8.6	8.3	8.6	8.7	8.6	8.5	9.1	9.2	8.8	9.5	9.6	9.5	9.3	9.5	9.3	8.8	7.9	8.3	8.5	8.8	8.9	8.9
Vineyard Haven, Mass.	6.5	6.6	6.5	6.8	7.0	7.2	7.1	8.4	9.4	9.4	10.1	10.5	10.8	10.9	10.8	10.1	9.8	8.8	8.1	7.4	7.6	8.4	7.9	7.0	8.4
Walla Walla, Wash.	7.1	6.6	6.3	5.9	6.4	6.4	6.1	6.1	6.5	6.7	6.7	7.9	8.5	8.5	9.4	9.5	9.0	8.4	8.0	7.5	7.2	6.5	6.7	7.3	7.3
Washington, D. C.	5.5	5.3	5.4	5.7	5.8	6.4	5.9	6.8	7.7	8.1	8.6	9.4	9.3	8.9	8.8	9.1	8.5	7.4	6.7	6.2	6.7	6.2	6.2	6.0	7.1
Wichita, Kans.	9.3	10.1	9.8	9.5	9.3	9.4	9.8	10.2	10.8	11.5	12.3	13.0	14.4	14.0	13.0	12.8	12.8	12.2	11.7	10.7	8.9	8.7	8.8	8.6	10.9
Williston, N. Dak.	7.3	6.6	6.6	6.5	6.6	6.7	7.3	7.2	7.5	6.7	7.1	9.0	10.8	11.7	11.8	12.0	12.0	11.6	10.4	9.4	8.8	7.7	7.5	7.1	8.6
Wilmington, N. C.	8.4	8.8	8.5	7.5	7.7	7.4	7.6	7.6	8.4	9.4	11.2	11.9	11.7	12.5	12.2	12.1	11.4	10.4	9.2	8.3	7.8	7.8	7.8	8.1	9.3
Woods Hole, Mass.	9.9	10.1	10.2	10.5	10.2	10.3	10.6	11.8	12.4	12.0	13.4	13.7	15.1	15.6	15.0	14.3	14.1	12.2	12.7	12.3	12.0	11.7	11.2	10.1	12.1
Yankton, S. Dak.	9.2	10.2	10.2	10.5	9.9	9.5	9.1	9.5	10.5	11.8	13.8	15.0	15.3	15.6	15.3	14.5	14.2	14.4	13.3	9.8	9.3	8.7	8.9	9.3	11.6

TABLE VII.—*Resultant winds from observations at 8 a. m. and 8 p. m., daily, during the month of March, 1898.*

Stations.	Component direction from—				Resultant.	
	N.	S.	E.	W.	Direction from—	Duration.
New England.	*Hours.*	*Hours.*	*Hours.*	*Hours.*	°	*Hours.*
Eastport, Me	15	25	9	28	s. 62 w.	22
Portland, Me	18	28	8	25	s. 60 w.	20
Northfield, Vt	12	47	1	5	s. 7 w.	35
Boston, Mass	12	26	12	23	s. 38 w.	18
Nantucket, Mass	17	25	17	16	s. 7 e.	8
Woods Hole, Mass.*	6	14	10	8	s. 14 e.	8
Block Island, R. I	14	30	22	22	s.	6
New Haven Conn	22	23	16	9	s. 82 e.	7
Middle Atlantic States.						
Albany, N. Y	20	29	9	13	s. 24 w.	10
Binghamton, N. Y.†	12	10	8	7	n. 27 e.	2
New York, N. Y	20	15	27	12	n. 72 e.	16
Harrisburg, Pa	16	16	28	13	e.	15
Philadelphia, Pa	21	20	25	11	n. 86 e.	14
Atlantic City, N. J	22	13	29	13	n. 61 e.	18
Cape May, N. J	30	12	24	10	n. 38 e.	23
Baltimore, Md	22	11	29	13	n. 56 e.	19
Washington, D. C	24	18	22	8	n. 67 e.	15
Lynchburg, Va	22	13	30	14	n. 61 e.	18
Norfolk, Va	28	15	29	7	n. 60 e.	26
Richmond, Va	39	12	19	4	n. 29 e.	31
South Atlantic States.						
Charlotte, N. C	24	19	29	8	n. 77 e.	22
Hatteras, N. C	34	17	12	6	n. 19 e.	18
Raleigh, N. C	32	13	20	9	n. 30 e.	22
Wilmington, N. C	23	17	24	14	n. 59 e.	12
Charleston, S. C	30	24	30	15	s. 51 e.	6
Augusta, Ga	24	18	23	15	n. 53 e.	10
Savannah, Ga	13	27	26	9	s. 51 e.	22
Jacksonville, Fla	18	26	29	9	s. 68 e.	22
Florida Peninsula.						
Jupiter, Fla	10	21	33	8	s. 66 e.	27
Key West, Fla	13	10	48	3	n. 86 e.	45
Tampa, Fla	20	14	25	20	n. 40 e.	8
Eastern Gulf States.						
Atlanta, Ga	19	19	23	18	e.	5
Pensacola, Fla	15	35	17	9	s. 22 e.	22
Mobile, Ala	20	31	13	10	s. 15 e.	11
Montgomery, Ala	16	29	20	10	s. 38 e.	16
Vicksburg, Miss	16	32	22	7	s. 43 e.	22
New Orleans, La	14	30	29	2	s. 59 e.	31
Western Gulf States.						
Shreveport, La	14	25	24	7	s. 57 e.	20
Fort Smith, Ark	16	14	36	5	n. 87 e.	31
Little Rock, Ark	17	22	22	13	s. 61 e.	10
Corpus Christi, Tex	20	23	34	2	s. 85 e.	32
Galveston, Tex	16	31	29	1	s. 62 e.	32
Palestine, Tex	23	26	27	5	s. 82 e.	22
San Antonio, Tex	23	23	34	2	e.	32
Ohio Valley and Tennessee.						
Chattanooga, Tenn	18	30	17	12	s. 23 e.	13
Knoxville, Tenn	28	19	11	19	n. 42 w.	12
Memphis, Tenn	30	24	27	5	s. 80 e.	22
Nashville, Tenn	22	27	18	6	s. 67 e.	13
Lexington, Ky	17	23	24	10	s. 67 e.	15
Louisville, Ky	24	21	18	11	n. 67 e.	8
Evansville, Ind.†	15	11	9	3	n. 56 e.	7
Indianapolis, Ind	24	26	11	12	s. 27 w.	2
Cincinnati, Ohio	21	25	13	12	s. 14 e.	4
Columbus, Ohio	21	20	25	11	n. 86 e.	14
Pittsburg, Pa	24	23	15	10	n. 79 e.	5
Parkersburg, W. Va	22	20	19	15	n. 63 e.	4
Lower Lake Region.						
Buffalo, N. Y	10	28	12	22	s. 29 w.	21
Oswego, N. Y	10	30	18	23	s. 14 w.	21
Rochester, N. Y	12	31	8	31	s. 50 w.	30
Erie, Pa	12	27	11	22	s. 36 w.	19
Cleveland, Ohio	17	26	24	14	s. 48 e.	14
Sandusky, Ohio	16	23	16	20	s. 30 w.	8
Toledo, Ohio	15	20	14	23	s. 61 w.	10
Detroit, Mich	17	21	16	16	s.	4
Upper Lake Region.						
Alpena, Mich	14	21	17	24	s. 45 w.	10
Grand Haven, Mich	15	24	22	18	s. 24 e.	10
Marquette, Mich	18	24	9	24	s. 68 w.	16
Port Huron, Mich	14	32	9	16	s. 21 w.	19
Sault Ste. Marie, Mich	15	19	21	22	s. 14 w.	4
Chicago, Ill	15	26	10	19	s. 39 w.	14

Stations.	Component direction from—				Resultant.	
	N.	S.	E.	W.	Direction from—	Duration.
Upper Lake Region—Cont'd.	*Hours.*	*Hours.*	*Hours.*	*Hours.*	°	*Hours.*
Milwaukee, Wis	16	23	16	18	s. 16 w.	7
Greenbay, Wis	16	29	12	18	s. 25 w.	14
Duluth, Minn	26	14	15	27	n. 45 w.	17
North Dakota.						
Moorhead, Minn	22	20	17	23	n. 72 w.	6
Bismarck, N. Dak	26	9	13	25	n. 35 w.	21
Williston, N. Dak	35	12	8	20	n. 28 w.	26
Upper Mississippi Valley.						
St. Paul, Minn	18	23	14	24	s. 63 w.	11
La Crosse, Wis.†	9	14	7	6	s. 11 e.	5
Davenport, Iowa	17	18	17	21	s. 76 w.	4
Des Moines, Iowa	24	21	13	16	n. 45 w.	4
Dubuque, Iowa	10	31	9	21	s. 30 w.	24
Keokuk, Iowa	17	25	16	16	s.	8
Cairo, Ill	24	25	20	8	s. 85 e.	12
Springfield, Ill	18	29	10	17	s. 32 w.	13
Hannibal Mo.†	7	13	9	7	s. 18 e.	6
St. Louis, Mo	21	21	21	10	e.	11
Missouri Valley.						
Columbia, Mo.*	10	11	12	6	s. 80 e.	6
Kansas City, Mo	22	20	21	14	n. 74 e.	7
Springfield, Mo	17	27	25	11	s. 63 e.	16
Lincoln, Nebr	25	24	16	8	n. 83 e.	8
Omaha, Nebr	24	25	12	16	s. 76 w.	4
Sioux City, Iowa†	10	13	8	6	s. 34 w.	4
Pierre, S. Dak	26	14	16	21	n. 23 w.	13
Huron, S. Dak	26	19	14	18	n. 17 w.	14
Yankton, S. Dak†	10	10	4	16	w.	12
Northern Slope.						
Havre, Mont	22	10	18	26	n. 34 w.	14
Miles City, Mont	31	17	9	19	n. 36 w.	17
Helena, Mont	16	19	7	35	s. 84 w.	28
Rapid City, S. Dak	23	11	13	32	n. 58 w.	22
Cheyenne, Wyo	21	17	7	31	n. 81 w.	24
Lander, Wyo	18	24	16	21	s. 40 w.	8
North Platte, Nebr	19	19	14	25	w.	11
Middle Slope.						
Denver, Colo	25	22	11	19	n. 69 w.	8
Pueblo, Colo	17	19	20	23	s. 56 w.	4
Concordia, Kans	22	25	15	7	s. 69 e.	8
Dodge City, Kans	18	30	11	11	s.	12
Wichita, Kans	22	28	14	9	s. 40 e.	8
Oklahoma, Okla	22	26	16	6	s. 68 e.	11
Southern Slope.						
Abilene, Tex	21	28	16	13	s. 23 e.	8
Amarillo, Tex	17	34	5	14	s. 28 w.	19
Southern Plateau.						
El Paso, Tex	19	9	11	36	n. 68 w.	27
Santa Fe, N. Mex	18	21	13	24	s. 75 w.	11
Phœnix, Ariz	17	10	20	28	n. 49 w.	11
Yuma, Ariz	20	14	11	29	n. 72 w.	19
Middle Plateau.						
Carson City, Nev	18	23	12	27	s. 72 w.	16
Winnemucca, Nev	18	23	15	20	s. 45 w.	7
Salt Lake City, Utah	23	20	12	25	n. 77 w.	13
Northern Plateau.						
Baker City, Oreg	22	26	9	23	s. 74 w.	15
Idaho Falls, Idaho	21	31	3	12	s. 42 w.	14
Spokane, Wash	13	27	19	15	s. 16 e.	15
Walla Walla, Wash	9	35	11	15	s. 9 w.	26
North Pacific Coast Region.						
Fort Canby, Wash	23	8	15	24	n. 31 w	18
Port Angeles, Wash.*	5	1	14	14	n.	4
Seattle, Wash	17	28	12	12	s.	11
Tacoma, Wash	21	27	7	24	s. 71 w.	18
Tatoosh Island, Wash	12	12	21	26	w.	5
Portland, Oreg	23	21	9	25	n. 83 w.	16
Roseburg, Oreg	23	13	19	23	n. 22 w.	11
Middle Pacific Coast Region.						
Eureka, Cal	25	16	15	22	n. 38 w.	11
Redbluff, Cal	31	13	12	19	n. 21 w.	19
Sacramento, Cal	24	26	11	10	s. 27 e.	2
San Francisco, Cal	16	10	6	40	n. 80 w.	34
South Pacific Coast Region.						
Fresno, Cal	37	6	12	25	s. 23 w.	34
Los Angeles, Cal	22	11	12	32	n. 61 w.	23
San Diego, Cal	26	8	16	26	n. 29 w.	21
San Luis Obispo, Cal	27	10	5	26	n. 51 w.	27

*From observations at 8 p. m. only. †From observations at 8 a. m. only.

TABLE VIII.—*Thunderstorms and auroras, March, 1898.*

States.	No. of stations.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total. No.	Total. Days.	
Alabama	55	T.													1	2	2	1	1				1	1					1	1			11	9	T.
		A.																															0	0	A.
Arizona	56	T.									6	3	2	1																			12	4	T.
		A.																															0	0	A.
Arkansas	59	T.	5	1		1					1	3	4	11		10	10	3	3	1	6	5	3	3	1		8	8	6					93	20	T.
		A.														2	1												1				4	3	A.
California	180	T.									9	1						1	1														12	4	T.
		A.																															0	0	A.
Colorado	72	T.					1			3		1																					5	3	T.
		A.	1													2	1				1												5	4	A.
Connecticut	21	T.																	1		12	3											16	3	T.
		A.	1													10	12					1											24	4	A.
Delaware	5	T.																	3														3	1	T.
		A.															1																1	1	A.
Dist. of Columbia	4	T.																	1														1	1	T.
		A.																															0	0	A.
Florida	45	T.							4																								4	1	T.
		A.																															0	0	A.
Georgia	55	T.														5	4	1			1					1			2		1		15	7	T.
		A.																															0	0	A.
Idaho	38	T.				2			1																								3	2	T.
		A.														3	2	1															6	3	A.
Illinois	86	T.														4	43	18	5	41	15	8	12	23	2		4	15	19	2			211	14	T.
		A.														29	25	2															56	3	A.
Indiana	57	T.														1	12	13		7	12		1	8	2			4	1				61	10	T.
		A.														14	20	4															38	3	A.
Indian Territory	7	T.						1				2	1	1		1					1			1	3			2	1				14	10	T.
		A.																															0	0	A.
Iowa	129	T.										1		1	1	14	9		8	10	4	1	10	7		1	5	13					85	14	T.
		A.														10	20	3	1						1								35	5	A.
Kansas	85	T.									13	2	1			15	2	2	14	15	3	1	7	6				6	9				96	14	T.
		A.						1								2	2																5	3	A.
Kentucky	48	T.											1	1		1	12	21	17	8	1							2	1	5			70	11	T.
		A.														3	8	1															12	3	A.
Louisiana	46	T.		1	1			1	1					3	1	3									1	1	2			1			16	11	T.
		A.																															0	0	A.
Maine	18	T.																	1				1					1					1	1	T.
		A.											1			10	12											1					25	5	A.
Maryland	40	T.																7	14	2	1				5	1			2				32	7	T.
		A.												1	6		1		1				1										10	5	A.
Massachusetts	59	T.																			3	6		1									11	4	T.
		A.		3												20	22	1					1										47	5	A.
Michigan	104	T.															6	1		6	7	1	1					1	5				28	8	T.
		A.						1							1	20	2															1		25	5	A.
Minnesota	67	T.														5	2			1		5	2						8				23	6	T.
		A.		1									2		3	7	20	1		1	4			1			1		1				42	11	A.
Mississippi	43	T.	1											1		8	1		1					1	1	2				1			17	9	T.
		A.																															0	0	A.
Missouri	95	T.									1	12	4	3		14	14	8	14	34	14	6	20	19	1		9	26	14	1		1		215	19	T.
		A.														1	8	1															10	3	A.
Montana	40	T.								1																							1	1	T.
		A.										1				2	1			1				1									6	5	A.
Nebraska	144	T.							1							18	2		1	10				1					2				35	7	T.
		A.										1			2	14	12	3	1	1				1					1				36	9	A.
Nevada	50	T.									2																						2	1	T.
		A.		1				1													1									1			4	4	A.
New Hampshire	21	T.																	2	1													3	2	T.
		A.													1	11	13	1				1									1		28	6	A.
New Jersey	51	T.			1														1	1	16	2			1						1		23	7	T.
		A.														12																	12	1	A.
New Mexico	34	T.	1								2	5	1																				9	4	T.
		A.																															0	0	A.
New York	113	T.																7	6		31	2		1	1								48	6	T.
		A.		1											1	27	19	1		1			1					1					52	8	A.
North Carolina	57	T.		1											3	1	3	3	4	4			1			16				1		8	5	50	12	T.
		A.																															0	0	A.
North Dakota	52	T.	1																														1	1	T.
		A.	2							1		3				1				1	7	1		5								1	22	9	A.
Ohio	134	T.												2		3	6	35	15	9	50	2	7	32	6			1		3			171	13	T.
		A.												1		22	22	1			2												48	5	A.
Oklahoma	21	T.										2		3				1	5		1	2	2	4	2			1	2					25	11	T.
		A.																															0	0	A.
Oregon	72	T.						1										1															2	2	T.
		A.														1	1	2	1														5	4	A.
Pennsylvania	105	T.													1	1	1	4	1	30	2	1	6	3				1		3			54	12	T.
		A.							1							15	1	1															19	5	A.
Rhode Island	8	T.																															0	0	T.
		A.			1											3	4																8	3	A.
South Carolina	40	T.		1											2	1		2	5							6	2			1	8	1	29	10	T.
		A.																															0	0	A.
South Dakota	56	T.														16	1			1								1	1			1	21	6	T.
		A.										1	1			6	6				2									1	1		19	8	A.
Tennessee*	4	T.												1		2	3	1	2									1	1	2			13	8	T.
		A.																															0	0	A.
Texas	89	T.	2					2	1			1	2	5		1	1							2	5	2		3	2	1	1			31	15	T.
		A.																															0	0	A.
Utah	38	T.								2																							2	1	T.
		A.													1	2																	3	2	A.
Vermont	14	T.													1				1														2	2	T.
		A.							1	1					1	8	8	1															20	6	A.
Virginia	48	T.												1			1	5	11						1	7				1			27	7	T.
		A.																															0	1	A.
Washington	50	T.												1																			1	1	T.
		A.					1									2	3	1															7	4	A.
West Virginia	33	T.															1	9	7	2									1				20	5	T.
		A.																															0	0	A.
Wisconsin	60	T.									1					1	14			1								3	11	4				35	7	T.
		A.		1							1			1	19	22	5	1				1			1					2			54	10	A.
Wyoming	17	T.																															0	0	T.
		A.														2	1																3	2	A.
Sums	2,816	T.	10	4	2	3	1	5	7	7	22	44	17	36	10	127	150	144	146	184	180	45	73	113	32	36	26	80	97	30	4	18	7	1,660	....	T.
		A.	4	7	1	0	1	2	3	2	1	6	4	2	30	289	232	27	3	6	17	4	4	7	0	3	1	2	1	3	5	1	3	691	....	A.

*Voluntary reports not received in time for use in this table.

TABLE IX.—*Average hourly sunshine (in percentages), March, 1898.*

Stations.	Instrument.	Percentages for each hour of local mean time ending with the respective hour.																Hours of sunshine.			
		A. M.								P. M.								Total.			Personal estimate.
		5	6	7	8	9	10	11	Noon	1	2	3	4	5	6	7	8	Actual.	Possible.	Percent of possible.	
																		Hours.	*Hours.*		
Albany, N. Y	T.	.....	14	26	32	46	64	74	77	83	80	76	77	64	55	43	.....	233.6	370.9	63	50
Atlanta, Ga	T.	.....	0	8	13	21	36	34	38	47	46	41	36	34	33	36	.....	121.3	372.3	33	34
Atlantic City, N. J	P.	.....	17	41	44	43	48	48	56	49	53	47	48	49	48	30	.....	177.2	371.4	48	39
Baltimore, Md	T.	.....	33	28	35	55	66	71	74	71	73	73	64	43	31	11	.....	211.1	371.4	57	36
Binghamton, N. Y	T.	.....	31	25	30	39	57	65	73	80	75	75	65	46	40	22	.....	207.0	370.8	56	45
Bismarck, N. Dak	P.	.....	56	47	49	57	56	60	58	53	52	52	51	44	38	46	.....	190.7	370.3	51	49
Boston, Mass	T.	.....	8	35	45	48	47	55	59	64	66	65	58	50	40	22	.....	194.1	370.8	52	42
Buffalo, N. Y	T.	.....	50	37	46	62	71	81	81	85	83	75	60	41	21	21	.....	229.6	370.9	62	37
Charleston, S. C	T.	.....	22	45	45	47	54	53	71	68	63	56	66	57	58	53	.....	213.1	372.3	57	52
Chattanooga, Tenn	T.	.....	0	8	10	17	30	41	43	48	55	50	50	41	24	17	.....	129.9	372.1	35	36
Cheyenne, Wyo	P.	.....	33	51	69	70	69	70	73	73	73	73	65	57	38	48	.....	241.2	371.2	65	47
Chicago, Ill	T.	.....	46	36	39	52	57	62	64	67	65	66	62	57	50	50	.....	209.8	370.8	57	56
Cincinnati, Ohio	T.	.....	17	19	22	35	43	48	55	58	55	51	42	38	30	15	.....	154.1	371.4	41	39
Cleveland, Ohio	T.	.....	46	41	46	55	55	57	61	58	57	52	47	41	35	26	.....	186.8	370.8	50	43
Columbia, Mo	T.	...	58	39	42	46	62	64	67	66	67	73	66	58	45	43	.....	215.9	371.4	58	38
Columbus, Ohio	T.	.....	42	37	42	49	63	67	68	75	70	64	54	45	33	28	.....	206.3	371.2	56	39
Denver, Colo	P.	.....	42	56	64	73	73	76	80	77	78	77	69	57	55	70	.....	258.8	371.2	70	53
Des Moines, Iowa	T.	.....	77	65	67	65	63	71	72	69	67	62	58	47	47	39	.....	232.7	370.8	63	61
Detroit, Mich	T.	.....	46	30	35	45	54	55	53	55	59	49	47	29	26	35	.....	166.1	370.8	45	36
Dodge City, Kans	P.	.....	8	43	48	52	61	62	68	67	70	71	65	63	55	50	.....	224.9	371.4	61	48
Dubuque, Iowa	T.	.....	46	30	32	46	58	68	71	73	70	67	58	49	44	48	.....	207.3	370.8	56	56
Eastport, Me	P.	.....	25	38	44	52	56	60	62	65	67	67	63	65	63	57	.....	217.2	370.7	59	44
Erie, Pa	T.	.....	31	35	40	47	52	62	70	74	64	59	52	49	51	41	.....	203.0	370.8	55	38
Eureka, Cal	.	.....	50	42	45	51	50	62	64	70	70	66	58	59	51	57	.....	213.7	371.2	58	47
Fresno, Cal	.	.....	91	69	62	66	79	84	86	85	84	83	80	68	71	78	.....	284.4	371.7	76	70
Galveston, Tex	P.	.....	0	16	40	44	45	45	56	57	54	48	46	40	15	8	.....	135.9	372.6	42	35
Harrisburg, Pa	T.	.....	17	26	33	45	62	74	75	79	78	75	70	54	37	22	.....	218.8	371.2	59	32
Helena, Mont	P.	.....	6	19	31	47	57	54	53	49	51	54	46	38	38	42	.....	167.2	370.3	45	42
Huron, S. Dak	T.	.....	33	38	41	55	61	62	66	68	71	68	66	45	43	46	.....	212.2	370.7	57	49
Idaho Falls, Idaho	T.	.....	14	33	32	42	59	72	78	76	78	69	60	48	29	34	.....	208.9	370.9	56	46
Indianapolis, Ind	T.	.....	25	25	27	42	53	52	53	52	45	39	37	37	32	30	.....	153.3	371.2	41	36
Jacksonville, Fla	T.	.....	12	55	61	69	78	80	79	82	84	83	78	63	53	47	.....	267.2	372.5	72	63
Kansas City, Mo. *	P.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	47
Key West, Fla	T.	.....	60	57	59	59	76	88	89	85	89	81	80	68	68	59	.....	280.3	373.5	75	61
Knoxville, Tenn	T.	.....	0	14	15	28	45	56	74	74	81	81	66	56	44	28	.....	197.4	371.8	53	49
Little Rock, Ark	T.	.....	10	31	39	45	49	50	55	56	55	50	44	30	23	11	.....	162.7	372.1	44	36
Los Angeles, Cal	P.	.....	90	69	71	76	77	81	77	82	84	85	79	75	74	85	.....	289.7	372.3	78	69
Louisville, Ky	T.	.....	25	18	20	35	39	42	46	49	44	44	38	32	29	28	.....	136.2	371.4	37	25
Minneapolis, Minn	T.	.....	38	32	34	44	59	70	68	59	62	55	40	29	19	20	.....	175.4	370.7	47	.....
Nashville, Tenn	T.	.....	27	36	38	43	45	51	56	56	68	64	55	50	44	36	.....	187.9	371.9	51	43
New Orleans, La	T.	.....	0	10	16	38	59	62	65	62	64	58	48	35	19	13	.....	166.2	372.5	45	46
New York, N. Y	T.	.....	0	13	31	41	46	52	59	60	64	66	65	53	38	13	.....	182.0	371.2	49	41
Northfield, Vt	P.	.....	40	44	56	66	67	70	66	68	72	69	61	57	46	30	.....	229.1	370.7	62	49
Oklahoma, Okla	T.	.....	20	27	31	43	51	57	56	59	62	63	55	49	41	36	.....	184.3	372.1	50	42
Omaha, Nebr	P.	.....	58	50	53	60	63	69	72	68	65	59	62	61	53	67	.....	227.9	371.2	61	54
Parkersburg, W. Va	T.	.....	42	29	29	29	34	44	39	36	40	44	29	26	25	11	.....	124.7	371.4	34	32
Philadelphia, Pa	T.	.....	17	29	35	37	43	49	56	62	59	56	43	38	32	22	.....	166.9	371.2	45	32
Phœnix, Ariz	P.	.....	78	74	80	86	86	84	87	85	87	90	87	71	66	72	.....	305.1	372.3	82	75
Pittsburg, Pa	T.	.....	50	28	26	31	32	59	67	69	61	61	52	52	52	43	.....	183.4	371.2	49	35
Portland, Me	T.	.....	13	23	42	55	69	69	76	85	83	75	70	69	47	35	.....	236.6	370.7	64	55
Portland, Oreg	T.	.....	2	13	17	37	54	66	77	80	79	75	67	45	34	33	.....	199.8	370.3	54	45
Raleigh, N. C	T.	.....	9	16	22	42	65	68	75	76	72	66	52	37	21	13	.....	188.9	371.9	51	32
Rochester, N. Y	T.	.....	36	41	47	55	63	67	66	69	73	64	62	34	25	28	.....	205.0	370.9	55	54
St. Louis, Mo	T.	.....	50	30	29	41	45	49	51	52	52	59	50	44	34	28	.....	165.7	371.4	45	35
St. Paul, Minn	P.	.....	62	46	44	53	63	62	65	58	59	55	45	37	44	51	.....	195.3	370.7	53	42
Salt Lake City, Utah	P.	.....	25	37	46	55	64	59	53	60	67	72	64	50	37	35	.....	205.8	371.2	55	27
San Diego, Cal	P.	.....	89	63	60	64	71	78	85	84	85	81	75	70	71	85	.....	276.4	372.3	74	68
San Francisco, Cal	T.	.....	8	26	55	69	75	81	86	94	93	89	87	85	54	52	.....	277.5	371.4	75	57
Santa Fe, N. Mex	P.	.....	64	58	74	85	88	84	80	78	77	70	74	70	51	45	.....	275.1	371.9	74	67
Savannah, Ga	P.	.....	22	44	50	61	68	73	72	76	77	70	68	58	50	48	.....	238.1	372.1	64	55
Seattle, Wash	T.	.....	0	6	14	27	37	50	64	63	63	52	47	35	17	14	.....	149.8	370.1	40	45
Spokane, Wash	T.	.....	22	26	33	54	62	69	76	72	74	73	66	55	37	25	.....	214.8	370.1	58	41
Tacoma, Wash	T.	.....	6	17	20	31	57	78	83	89	87	83	75	48	39	33	.....	219.2	370.3	59	44
Tampa, Fla	T.	.....	83	76	69	70	76	74	75	78	76	71	65	66	79	80	.....	272.6	372.8	73	74
Vicksburg, Miss	T.	.....	22	11	21	35	45	55	60	65	65	56	50	37	13	4	.....	159.0	372.1	43	47
Washington, D. C	P.	.....	33	33	38	44	36	45	52	47	47	47	43	38	33	24	.....	155.8	371.4	42	41
Wilmington, N. C	T.	.....	20	21	37	55	65	74	79	72	69	67	66	49	19	6	.....	208.1	372.3	56	47
Yankton, S. Dak	T.	.....	43	41	46	63	73	75	76	78	80	78	62	51	42	43	.....	237.1	370.9	64	55

* Record incomplete.

TABLE X.—*Accumulated amounts of precipitation for each 5 minutes, for storms in which the rate of fall equaled or exceeded 0.25 in any 5 minutes, or 0.75 in 1 hour during March, 1898, at all stations furnished with self-registering gauges.*

Stations.	Date.	Total duration.		Total am't of precipitation.	Excessive rate.		Amount before excessive began.	Depths of precipitation (in inches) during periods of time as indicated.												
		From—	To—		Began—	Ended—		5 min.	10 min.	15 min.	20 min.	25 min.	30 min.	35 min.	40 min.	45 min.	50 min.	60 min.	80 min.	100 min.	120 min.
	1	2	3	4	5	6	7														
Albany, N. Y.*																					
Atlanta, Ga.	13-14	2.00 p. m.	8.30 a. m.	1.29	7.15 a. m.	7.45 a. m.	0.77	0.04	0.14	0.23	0.38	0.48	0.52								
Atlantic City, N. J	31			0.39														0.20			
Baltimore, Md	29			0.99														0.23			
Binghamton, N. Y.	19			0.63														0.46			
Bismarck, N. Dak.*																					
Boston, Mass.	19			0.45														0.15			
Buffalo, N. Y.	12			0.39														0.08			
Cairo, Ill.	11-12			2.67														0.45			
Charleston, S. C.	3-4			1.28														0.42			
Chicago, Ill.	27			0.96														0.42			
Cincinnati, Ohio	16			0.22							0.22										
Cleveland, Ohio	19	d. n.	4.30 a. m.	1.45	2.07 a. m.	3.37 a. m.	0.15	0.08	0.13	0.19	0.23	0.27	0.31	0.37	0.49	0.55	0.64	0.76	1.15	1.25	
Columbia, Mo.*																					
Columbus, Ohio	22-23	8.45 p. m.	d. n.	1.21	9.15 p. m.	9.40 p. m.	0.01	0.15	0.36	0.45	0.49	0.58	0.61	0.66	0.70	0.73					
Denver, Colo.*																					
Des Moines, Iowa	27			0.64														0.12			
Detroit, Mich	12-13			1.10														0.58			
Dodge City, Kans.	17			0.04								0.04									
Duluth, Minn.*																					
Eastport, Me.	19			0.35														0.11			
Erie, Pa.	19			0.88														0.47			
Fresno, Cal.	15			0.22												0.16					
Galveston, Tex.	1	2.51 p. m.	8.30 p. m.	1.28	3.31 p. m.	3.55 p. m.	0.02	0.26	0.51	0.60	0.69	0.73									
Harrisburg, Pa	22			0.59														0.16			
Hatteras, N. C.	3-4			1.22														0.30			
Huron, S. Dak.	14			0.37												0.35					
Idaho Falls, Idaho*																					
Indianapolis, Ind.	26-27			2.09														0.57			
Jacksonville, Fla.	3	8.50 a. m.	4.50 p. m.	1.98	2.30 p. m.	2.50 p. m.	1.13	0.05	0.25	0.35	0.46	0.50	0.53	0.56	0.58	0.60	0.62	0.72	0.85		
Jupiter, Fla.*																					
Kansas City, Mo.	26	4.21 p. m.	8.30 p. m.	1.02	6.30 p. m.	7.05 p. m.	0.20	0.04	0.11	0.22	0.33	0.44	0.51	0.57	0.62	0.69					
Key West, Fla.	3	7.45 a. m.	10.21 a. m.	0.65	7.57 a. m.	8.15 a. m.	0.05	0.15	0.35	0.45	0.50										
Knoxville, Tenn.	13			0.61														0.26			
Lincoln, Nebr.*																					
Little Rock, Ark.	12			0.68														0.49			
Los Angeles, Cal.	10			0.50														0.16			
Louisville, Ky.	16-17	11.20 p. m.	d. n.	1.40	11.22 p. m.	12.05 a. m.	0.01	0.30	0.35	0.43	0.55	0.71	0.93	1.06	1.12	1.14					
Memphis, Tenn.	27-28	7.40 p. m.	7.05 a. m.	1.06	7.57 p. m.	8.42 p. m.	0.01	0.29	0.41	0.49	0.52	0.62	0.71	0.73	0.76	0.78					
Milwaukee, Wis.	10-11			1.01														0.20			
Montgomery, Ala.	29-30			0.85														0.21			
Nantucket, Mass.	19			0.58														0.31			
Nashville, Tenn.	28			1.39														0.55			
New Orleans, La.	28			0.26														0.16			
New York, N. Y.	29-30			0.81														0.16			
Norfolk, Va.	4			1.52														0.25			
Northfield, Vt.	19-20			0.24														0.06			
Oklahoma, Okla.	12			1.30														0.39			
Omaha, Nebr.	14			0.18														0.17			
Parkersburg, W. Va.	20-21			0.94														0.30			
Philadelphia, Pa.	29-30			0.68														0.25			
Pittsburg, Pa.	22-23			0.68														0.53			
Portland, Me.	19			0.18														0.06			
Portland, Oreg.	24			0.39														0.19			
Raleigh, N. C.	29-30			1.71														0.23			
Richmond	24			0.90														0.41			
Rochester, N. Y.	13			0.30														0.30			
St Louis, Mo.	22			0.95														0.42			
St. Paul, Minn.	27-28			1.02														0.24			
Salt Lake City, Utah*																					
San Diego, Cal.	26			0.28														0.26			
San Francisco, Cal.	7-8			0.13														0.04			
Savannah, Ga.	3-4			1.81														0.37			
Seattle, Wash.	24-25			0.42														0.08			
Spokane, Wash.*																					
Tampa, Fla.	3			0.05														0.05			
Vicksburg, Miss.	28-29			1.89														0.42			
Washington, D. C.	29-30			0.65														0.13			
Wilmington, N. C.	3-4			0.78														0.24			
Yankton, S. Dak.*																					

*No record.

TABLE XI.—*Excessive precipitation, by stations, for March*, 1898.

Stations.	Monthly rainfall 10 inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
Alabama.	*Inches.*	*Inches.*		*Ins.*	*h.m.*	
Newburg		2.70	28			
Arkansas.						
Blanchard Springs				1.35	1 00	12
Corning		3.30	11-12			
Fayetteville	15.07	2.50	17			
Do		2.73	26-27			
Fort Smith	10.53	2.68	11-12			
Do		3.83	26-27			
Hardy		3.48	12			
Keesees Ferry	15.08	2.74	12			
Do		2.83	26-27			
La Crosse	10.74	5.40	11-12			
Mossville	17.17	3.18	11			
Do		5.55	26-27			
Mount Nebo		4.25	11-12			
Ozark	10.15	3.00	12			
Do		3.25	26			
Pocahontas		3.40	12			
Powell	16.25	4.00	27			
Russellville		3.10	12			
Silver Springs	15.02	3.50	20-21			
Spielerville		3.45	11-12			
Do		2.55	26-27			
Winslow	17.56	7.04	11-12			
Do		4.47	26-27			
Witts Springs		3.24	12			
Georgia.						
Cedartown				1.03	0 30	28
Clayton		3.70	29			
Greenbush				1.00	0 15	28
Illinois.						
Albion	12.39					
Atwood	10.89	3.22	22			
Beardstown		2.83	10-11			
Do		3.82	26-27			
Cairo		2.67	11-12			
Carlyle	11.93					
Cisne	11.99					
Cobden	14.16	2.59	20-21			
Decatur		4.28	26-27			
Effingham	12.77	2.85	27-28			
Equality		2.60	21			
Friendgrove	11.38					
Grayville	11.37					
McLeansboro	11.11					
Mascoutah	11.33					
Mount Carmel	11.35					
Mount Pulaski		5.42	26-27			
Mount Vernon	11.94					
Olney	10.97					
Palestine	11.45					
Philo		2.51	22			
Plumhill	13.05	2.72	27			
Robinson	14.01	2.97	20-21	1.00	0 15	21
Springfield		4.68	26-27			
Indiana.						
Bloomington	10.30					
Cambridge City	11.04	2.80	23			
Connersville	10.93	2.80	22			
Crawfordsville	11.20	3.30	22			
Edwardsville	11.08					
Franklin		2.55	22			
Greencastle	10.62					
Greensburg	10.84					
Indianapolis		2.71	21-22			
Jeffersonville	10.10					
Knightstown	10.87	4.19	21-22			
Kokomo		2.65	21	1.00	0 20	19
Mauzy	10.67					
Northfield		3.65	21-22			
Princeton	14.65					
Richmond	11.36	4.14	22			
Rockport		3.15	20-21			
Shelbyville		3.19	22			
Syracuse		2.57	19			
Terre Haute	11.03					
Vevay	10.43	3.10	20-21			
Vincennes	10.59					
Washington	10.17					
Worthington	11.07	2.84	22			
Indian Territory.						
South McAlester		4.84	11-12			
Tahlequah	12.25	2.74	21			

TABLE XI.—*Excessive precipitation*—Continued.

Stations.	Monthly rainfall 10 inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
Kansas.	*Inches.*	*Inches.*		*Ins.*	*h.m.*	
Morantown				1.25	1 00	18
Olathe				1.48	0 50	26
Kentucky.						
Blandville	10.16					
Earlington	10.01					
Irvington	10.30					
Louisville				1.19	1 00	16-17
Lyndon	10.33					
Owensboro	10.21					
Missouri.						
Birchtree	14.67	2.52	11-12			
East Lynne		3.11	10-11			
Edgehill	12.72	3.21	26-27			
Eightmile		2.80	10			
Fulton		3.35	21-22			
Glasgow		3.87	26	3.87	4 00	26
Gordonville	12.70					
Hannibal		3.62	26-27	2.90	2 00	26-27
Houston	10.71	2.93	27			
Ironton	11.60					
Lamonte		2.50	10-11			
Mansfield	13.75	3.00	26-27			
Marblehill	12.68	2.49	11-12			
Marshall		2.90	26-27			
Mineralspring	10.72					
Neosho		2.65	9-10			
New Madrid		2.50	11-12			
Oakmound	14.12	5.10	11-12			
Olden	15.24	2.88	11-12			
Do		3.06	19-20			
Oto	10.30					
Poplar Bluff	12.81	2.97	12			
Do		2.95	20			
Potosi	11.61					
Seymour	11.27					
Sikeston	11.88	2.50	19-20			
Sublett	11.30	3.45	18			
Do		5.25	26-27			
Willow Springs	15.48	3.45	27			
Zeitonia	11.01					
North Carolina.						
Bryson City		3.05	28-29			
Charlotte		2.75	29-30			
Highlands	11.30	9.07	28-29			
Horse Cove		6.24	28-29			
Mount Pleasant		2.64	29-30			
Ohio.						
Basil		2.75	21			
Canal Dover		2.54	23			
Cardington		2.85	24			
Cedarville	11.09					
Columbus		2.52	22			
Killbuck				1.25	1 00	22
Levering		3.05	22-23			
Milfordton		2.57	21-22			
New Paris	10.20	3.45	22			
New Waterford		2.75	22-23			
North Lewisburg		4.35	22-23			
Rosewood		4.46	22-23			
Sandusky		2.83	19	2.00	2 00	19
Urbana		3.40	22-23			
Warsaw		4.57	22-23			
Pennsylvania.						
Beaver Dam		2.76	22-23			
Brookville		2.66	22-23			
Freeport		2.53	22-23			
South Carolina.						
Yorkville		2.87	29-30			
Tennessee.						
Dover		2.90	15			
McKenzie		4.00	15			
Trenton		3.44	14-15			
Texas.						
Camp Eagle Pass				2.10	1 45	2
Forestburg		2.50	27			
Marshall				1.04	1 00	12
West Virginia.						
Eastbank		2.90	28-29			
Weston	10.05					
Wisconsin.						
Osceola		3.30	27-28			

Chart I. Tracks of Centers of High Areas. March, 1898.

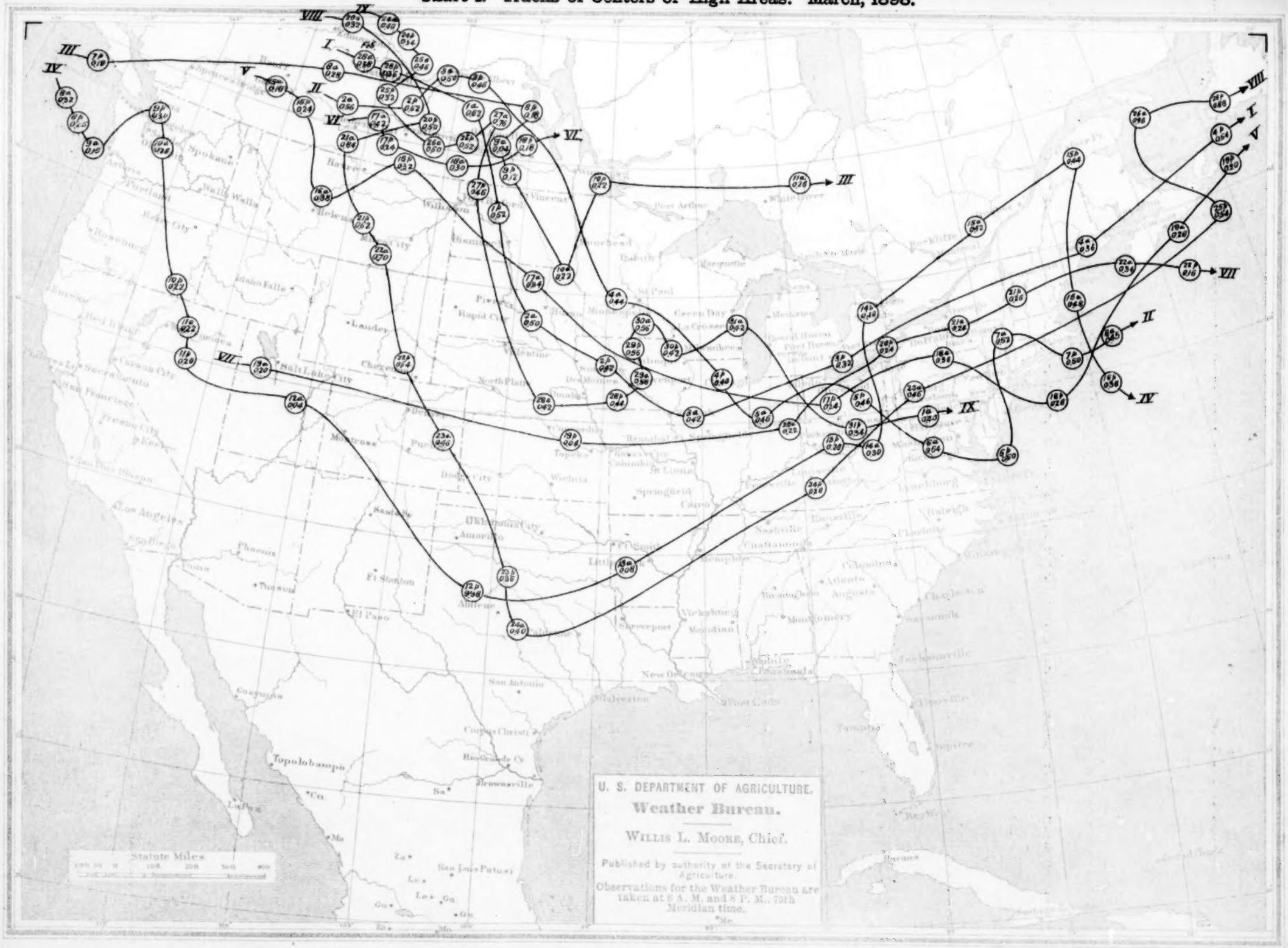


Chart II. Tracks of Centers of Low Areas. March, 1898.

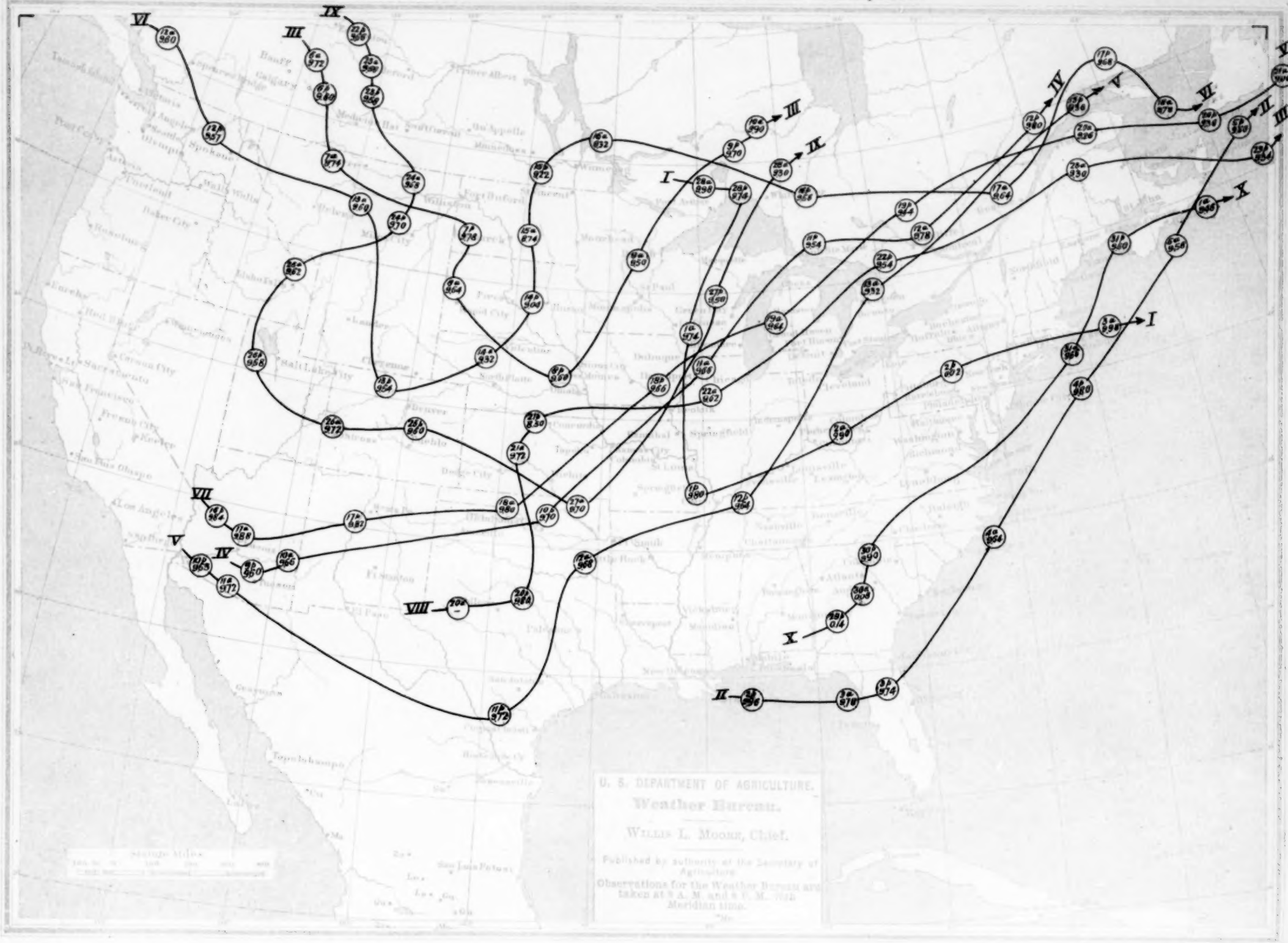


Chart III. Total Precipitation. March, 1898.

Chart III. Total Precipitation. March, 1898.

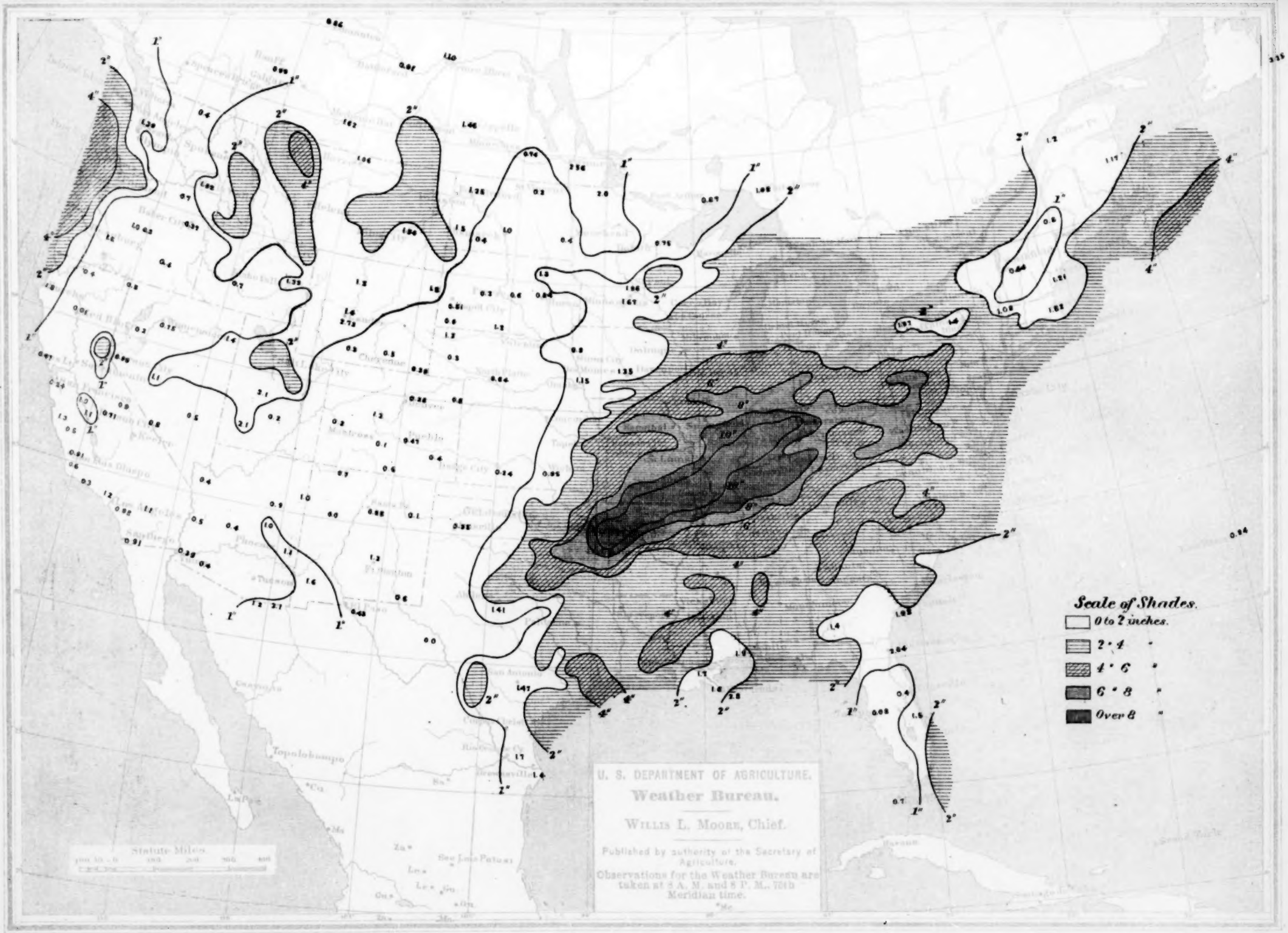
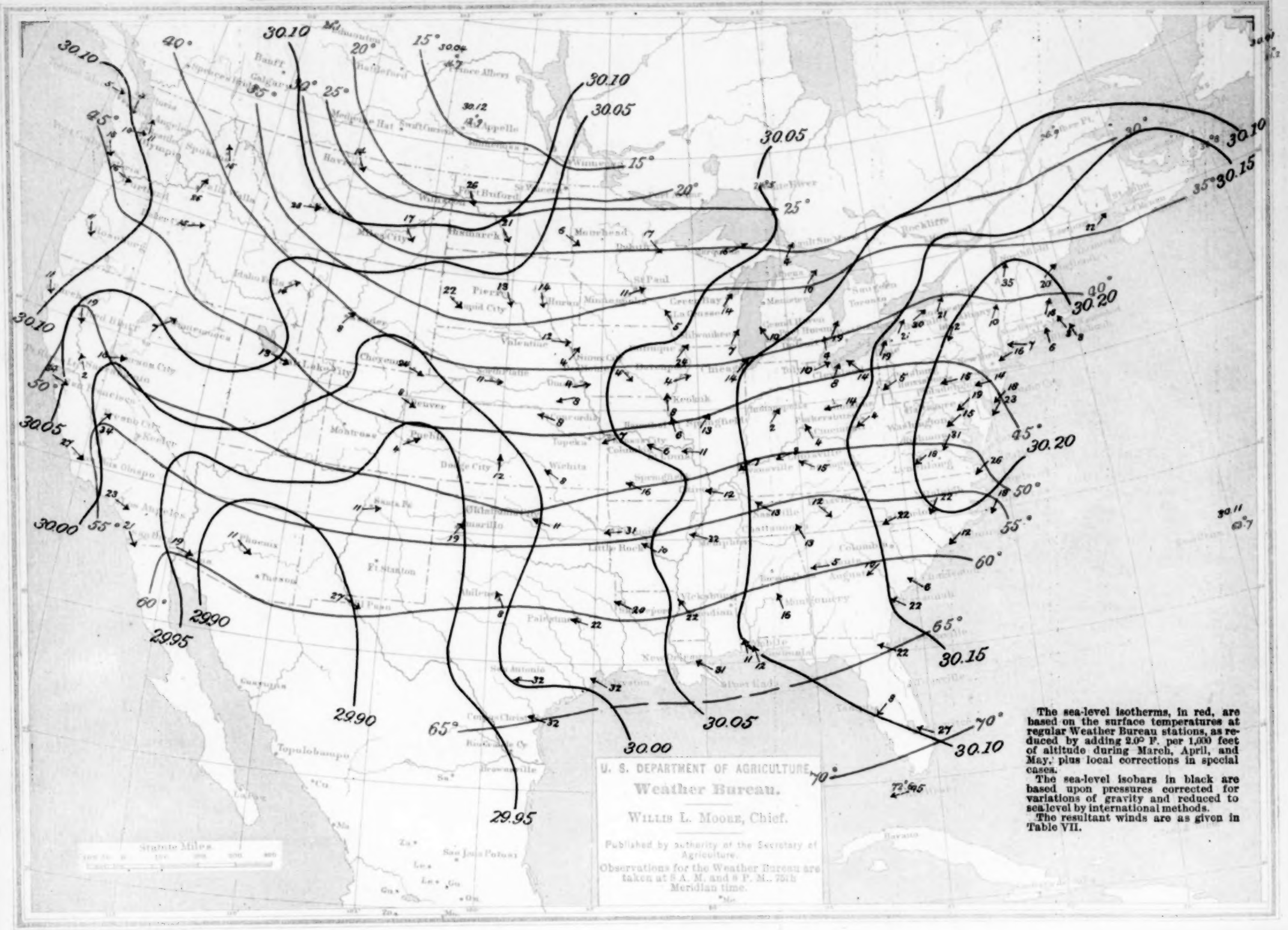

Scale of Shades.
0 to 2 inches.
2 " 4 "
4 " 6 "
6 " 8 "
Over 8 "
U. S. DEPARTMENT OF AGRICULTURE.
Weather Bureau.
WILLIS L. MOORE, Chief.
Published by authority of the Secretary of Agriculture.
Observations for the Weather Bureau are taken at 8 A. M. and 8 P. M. 75th Meridian time.
Statute Miles
Topolobampo
San Luis Potosi

Chart IV. Sea-Level Pressure and Temperature and Resultant Surface Winds. March, 1898.



The sea-level isotherms, in red, are based on the surface temperatures at regular Weather Bureau stations, as reduced by adding 2.0° F. per 1,000 feet of altitude during March, April, and May, plus local corrections in special cases.

The sea-level isobars in black are based upon pressures corrected for variations of gravity and reduced to sea-level by international methods.

The resultant winds are as given in Table VII.

Chart V. Hydrographs for Seven Principal Rivers of the United States. March, 1898.

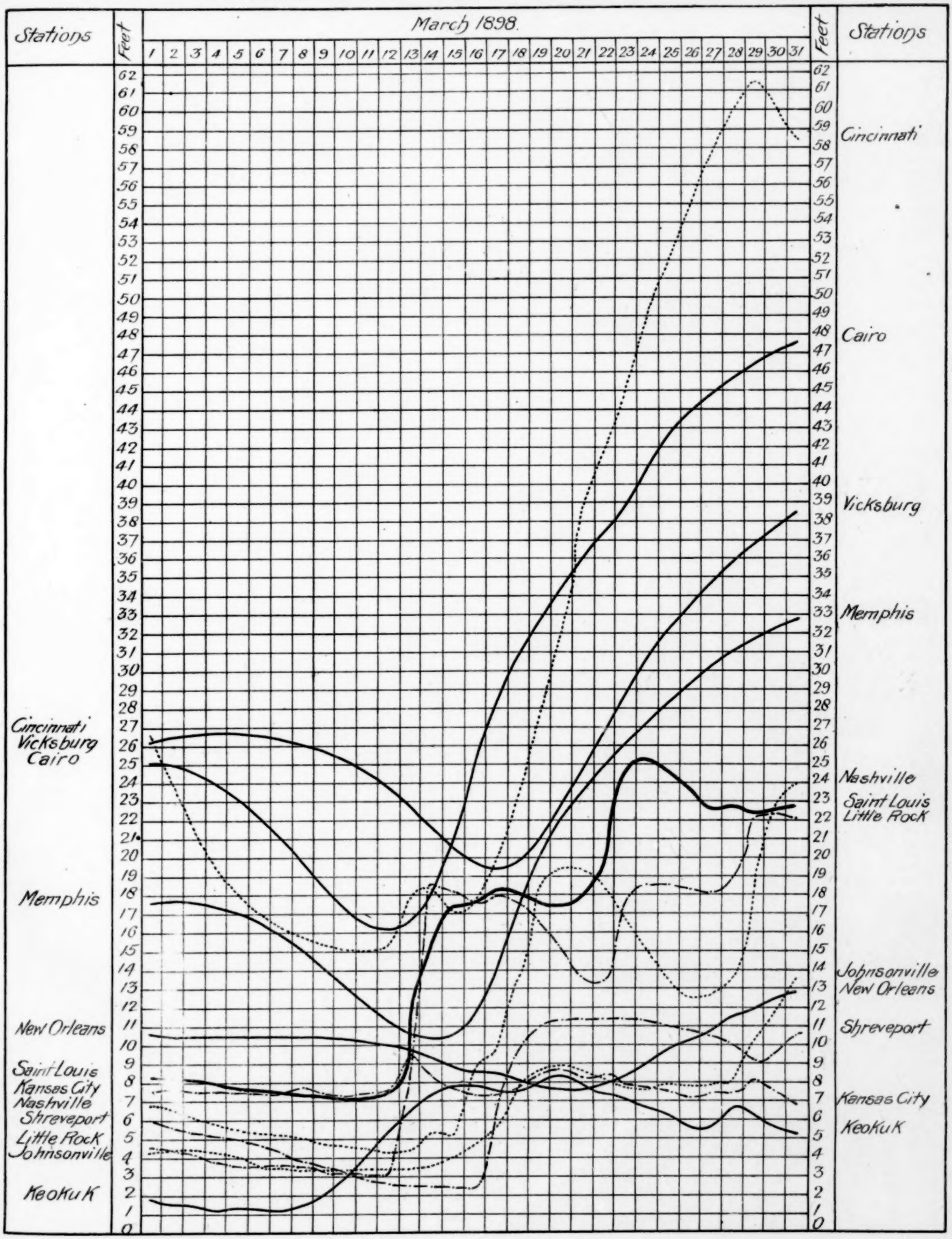

Stations
Feet
March 1898.
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
62 61 60 59 58 57 56 55 54 53 52 51 50 49 48 47 46 45 44 43 42 41 40 39 38 37 36 35 34 33 32 31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Cincinnati
Cairo
Vicksburg
Memphis
Nashville
Saint Louis
Little Rock
Johnsonville
New Orleans
Shreveport
Kansas City
Keokuk
Cincinnati
Vicksburg
Cairo
Memphis
New Orleans
Saint Louis
Kansas City
Nashville
Shreveport
Little Rock
Johnsonville
Keokuk

Chart VI. Surface Temperatures; Maximum, Minimum, and Mean. March, 1898.

Chart VI. Surface Temperatures; Maximum, Minimum, and Mean. March, 1898.

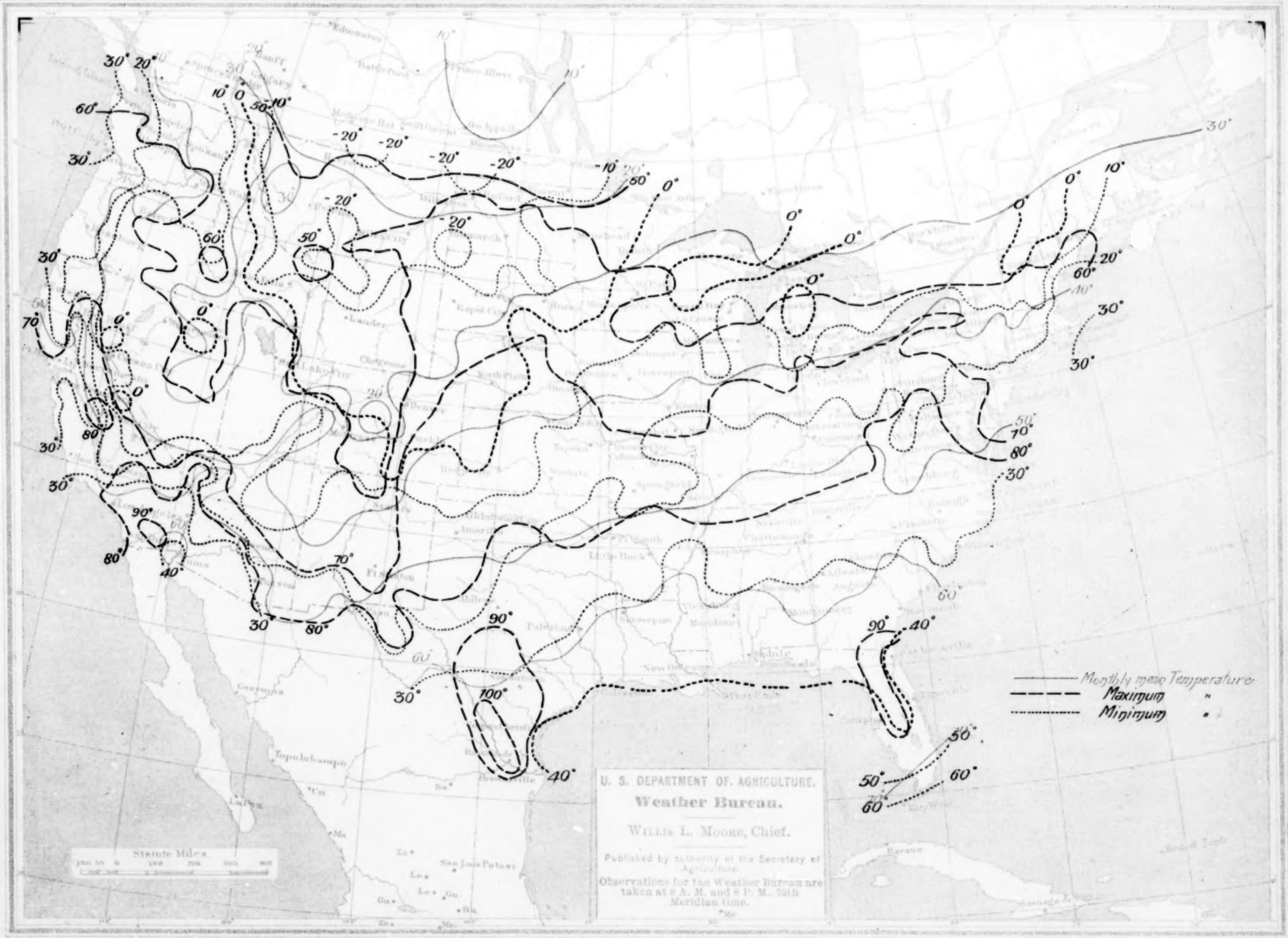

Monthly mean Temperature
Maximum "
Minimum "
Statute Miles
U. S. DEPARTMENT OF AGRICULTURE.
Weather Bureau.
WILLIS L. MOORE, Chief.
Published by authority of the Secretary of Agriculture.
Observations for the Weather Bureau are taken at 8 A. M. and 8 P. M., 75th Meridian time.

Chart VII. Percentage of Sunshine. March, 1898.

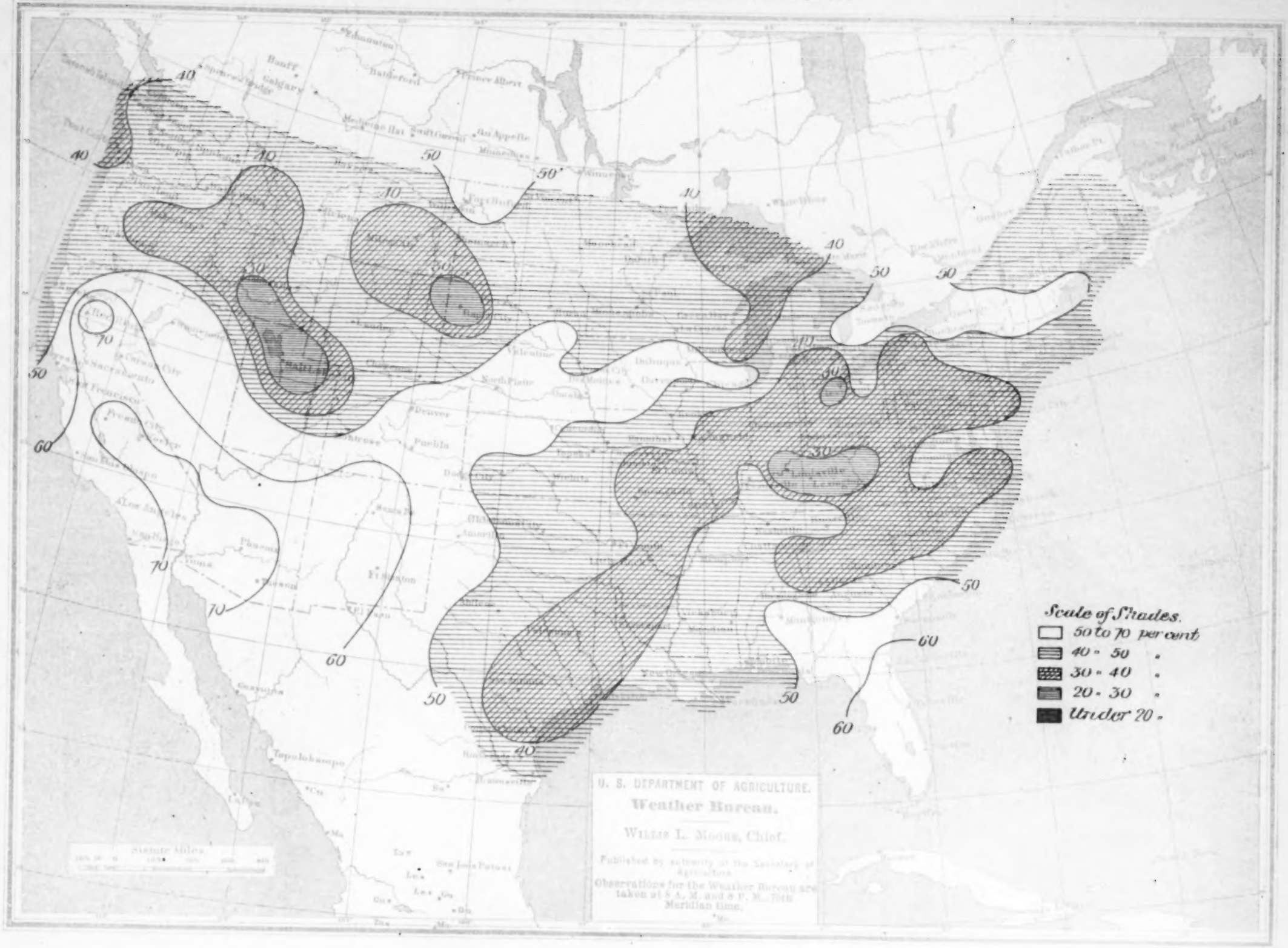

Scale of Shades.
50 to 70 per cent
40 - 50 "
30 - 40 "
20 - 30 "
Under 20 "
U. S. DEPARTMENT OF AGRICULTURE.
Weather Bureau.
Willis L. Moore, Chief.
Published by authority of the Secretary of Agriculture.
Observations for the Weather Bureau are taken at 5 A. M. and 8 P. M. 75th Meridian time.
Statute Miles

Chart VIII. Total Snowfall. March, 1898.

Chart VIII. Total Snowfall. March, 1898.

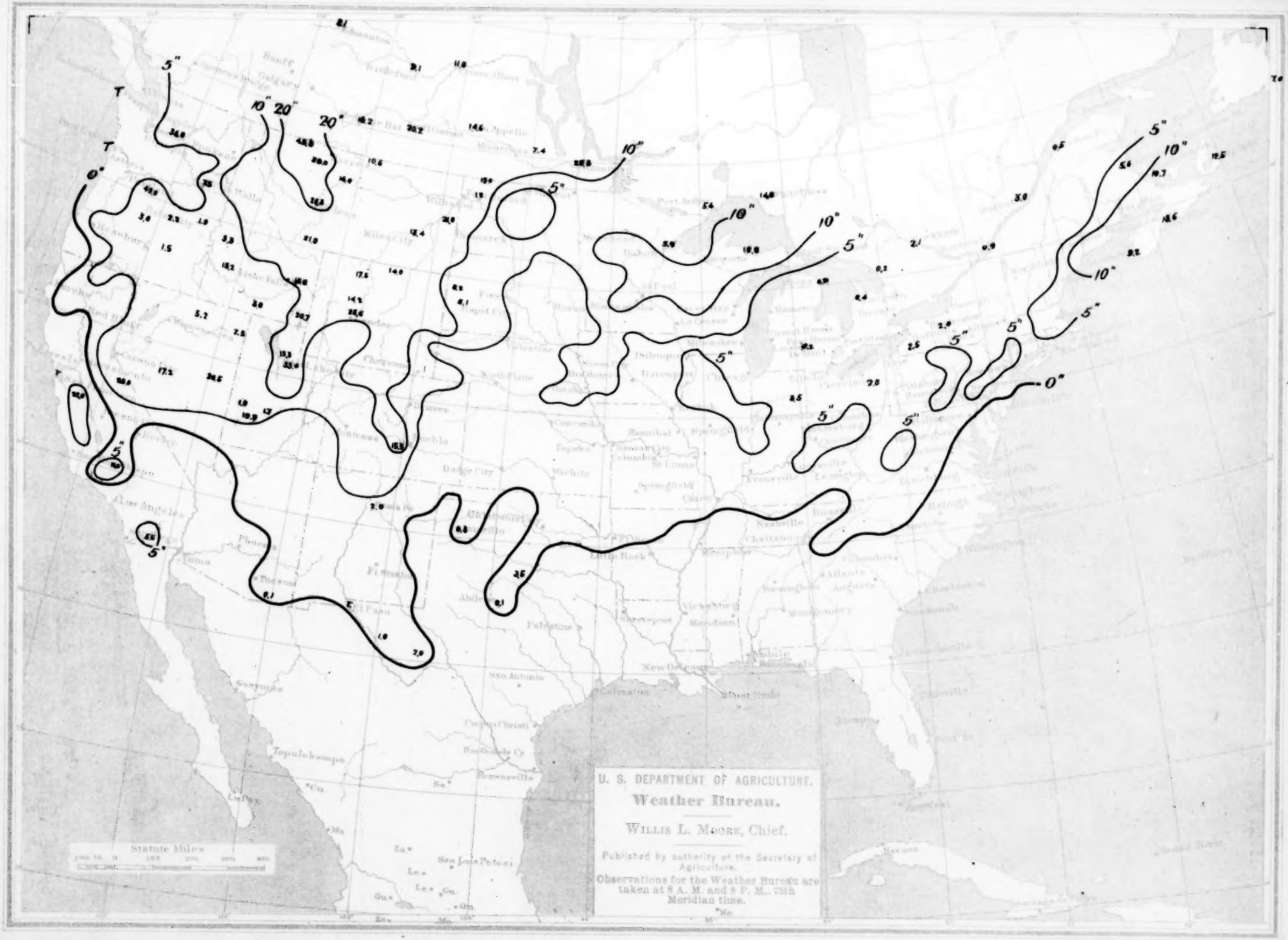


Chart IX. Depth of Snow on Ground at Close of the Month. March, 1898.

Chart X. Average Annual Sunshine

Chart X. Average Annual Sunshine.

Scale of Shades.
70 to 80 per cent
60 " 70 "
50 " 60 "
40 " 50 "
Under 40 "
Statute Miles.
U. S. DEPARTMENT OF AGRICULTURE.
Weather Bureau.
Willis L. Moore, Chief.
Published by authority of the Secretary of Agriculture.
Observations for the Weather Bureau are taken at 8 A. M. and 8 P. M., 75th Meridian time.

Chart XI. Average Annual Snowfall.

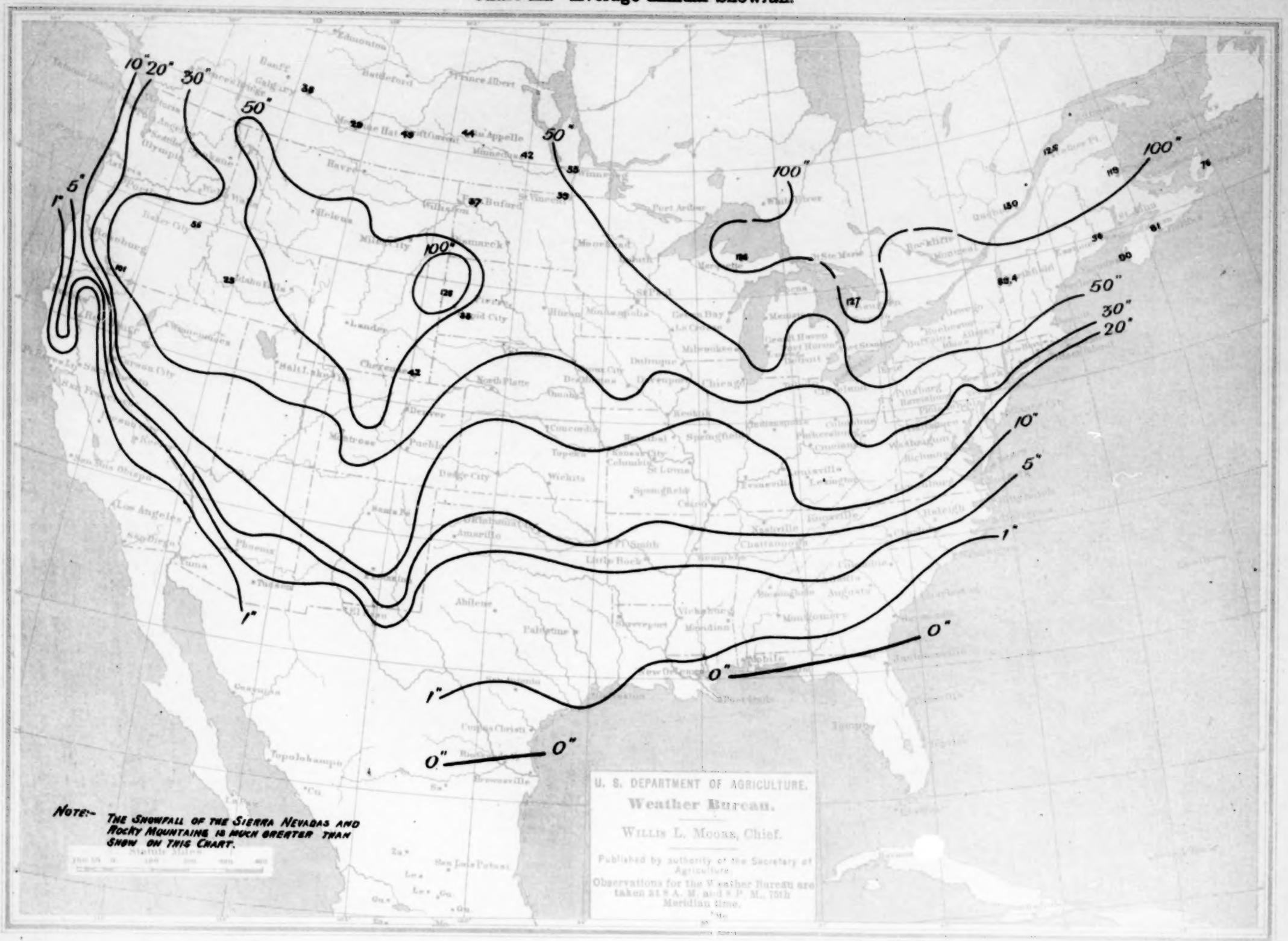

10"
20"
30"
50"
100"
5"
1"
0"
Note:- The Snowfall of the Sierra Nevadas and Rocky Mountains is much greater than shown on this Chart.
U. S. DEPARTMENT OF AGRICULTURE.
Weather Bureau.
Willis L. Moore, Chief.
Published by authority of the Secretary of Agriculture.
Observations for the Weather Bureau are taken at 8 A. M. and 8 P. M., 75th Meridian time.

Chart XII. Upper Clouds and Weather Changes.

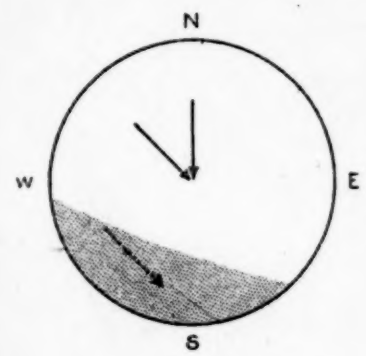


Fig. 1.

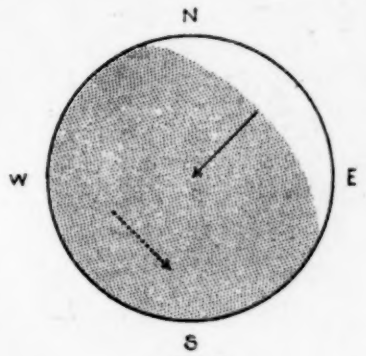


Fig. 2.

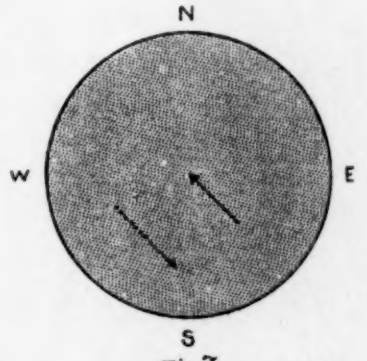


Fig. 3.

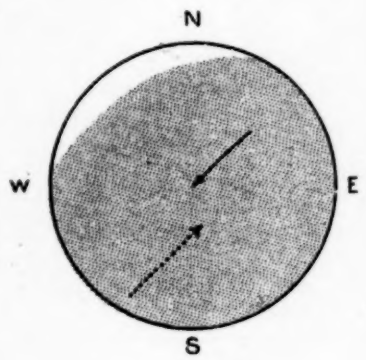


Fig. 4.

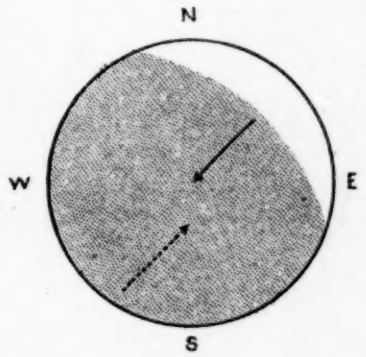


Fig. 5.

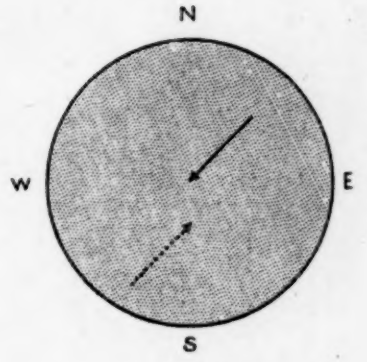


Fig. 6.

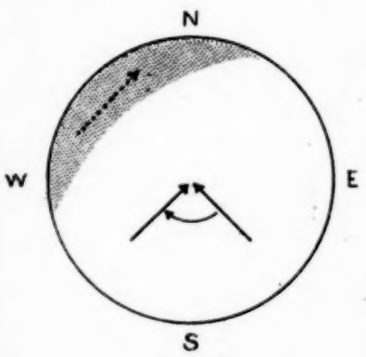


Fig. 8.

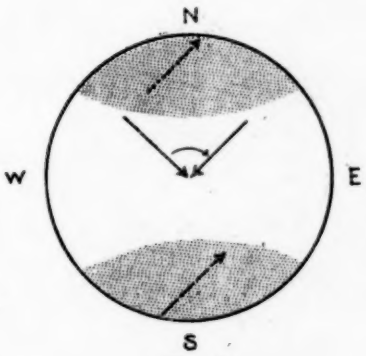


Fig. 9.

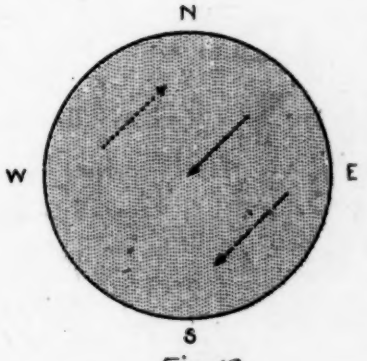


Fig. 10.

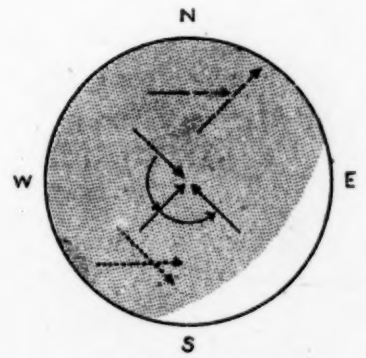


Fig. 7.

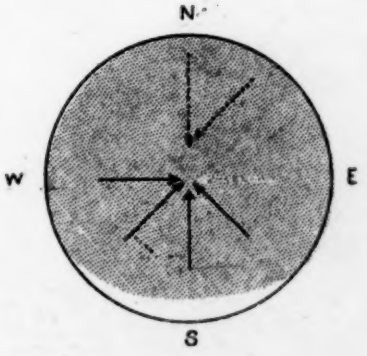


Fig. 11.

NOTE. — The dotted arrows belong to the highest upper clouds; the dashed arrows belong to the lower clouds; the full-line arrows represent the wind. The circle represents the whole visible sky down to the lowest clouds that can be seen in the horizon.

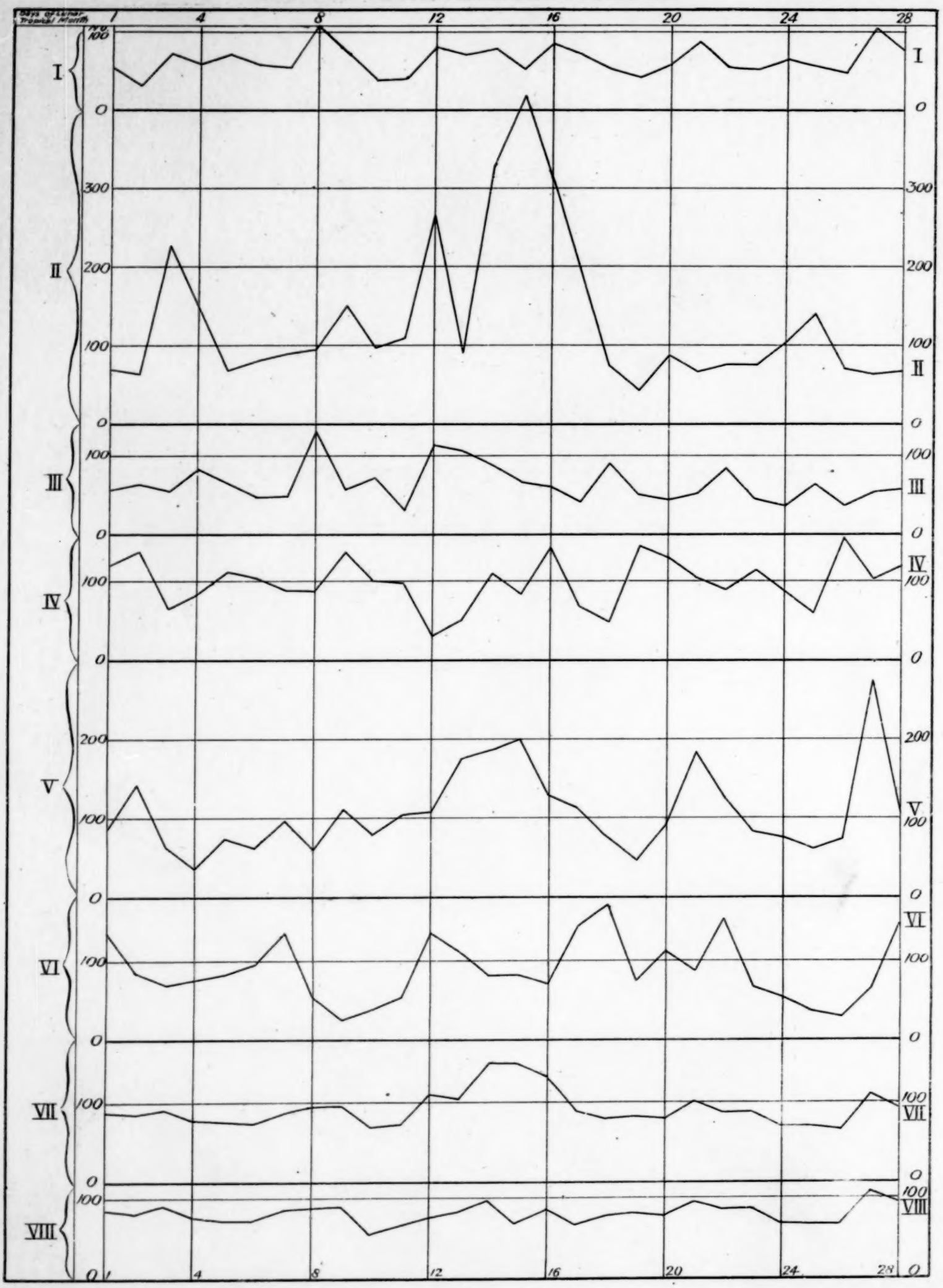



Chart XIII. Auroras and the Moon's Declination.